

Section 2: Driving Safely

This section contains general knowledge and safe driving practices which **all** commercial drivers should know. You must take a test on this information to get a commercial driver's license.

This section does **not** contain information on air brakes, combination vehicles (tractor-semitrailer, doubles, triples, truck pulling heavy trailer) or buses. You must read other sections to get such information if it applies to the type of vehicle you wish to drive.

This section does have some information on hazardous materials. We put it in so you will know when you require a Hazardous Materials Endorsement. You will find the information you need to get this endorsement in Section 7.

This Section Covers

- **Vehicle Inspection**
- **Vehicle Control**
- **Shifting Gears**
- **Seeing**
- **Communicating**
- **Speed & Space Management**
- **Night Driving**
- **Winter Driving**
- **Mountain Driving**
- **Emergencies**
- **Staying Alert**

Safety. Safety is the most important and obvious reason. Inspecting your vehicle helps you to know your vehicle is safe.

Legal requirements. Federal and State laws require inspection by the driver. Federal and State inspectors also inspect commercial vehicles. An unsafe vehicle can be put "out of service" until the driver or owner fixes it.

Pretrip Inspection. You do a pretrip inspection before each trip to find problems that could cause a crash or breakdown.

During a Trip. For safety you should:

- Watch gauges for signs of trouble.
- Use your senses to check for problems (look, listen, smell, feel).
- Check critical items when you stop:
 - Tires, wheels and rims.
 - Brakes.
 - Lights.
 - Brake and electrical connections to trailer.
 - Trailer coupling devices.
 - Cargo securement devices.

After-Trip Inspection and Report. You do an after-trip inspection at the end of the trip, day, or tour of duty on each vehicle you operated. It may include filling out a **vehicle condition report** listing any problems you find. The inspection report helps the vehicle owner know when to fix something.

Look for Tire Problems. It is dangerous to drive with bad tires. Look for problems such as:

- Too much or too little air pressure.

2.1 Vehicle Inspection

- **Why Inspect?**

- **Types of Vehicle Inspection**

- **What to Look For**

- Bad wear. You need at least 4/32 inch tread depth in every major groove on front wheels. You need 2/32 inch on other wheels. No fabric should show through the tread or sidewall.
- Cuts or other damage.
- Tread separation.
- Dual tires that come in contact with each other or parts of the vehicle.
- Mismatched sizes.
- Radial and bias-ply tires used together.
- Cut or cracked valve stems.
- Regrooved, recapped, or retreaded tires on the front wheels of a bus. These are prohibited.

Wheel and Rim Problems

- Bad wheels or rims could cause an accident.
- A damaged rim can cause the tire to lose pressure or come off.
- Rust around wheel nuts may mean the nuts are loose - check tightness.
- After a tire has been changed, stop a short while later and recheck tightness of nuts.
- Missing clamps, spacers, studs, lugs means danger.
- Mismatched, bent, cracked, lock rings are dangerous.
- Wheels or rims that have had welding repairs are not safe.

Bad Brake Drums or Shoes

- Cracked drums.
- Shoes or pads with oil, grease, brake fluid on them.
- Shoes worn dangerously thin, or missing or broken.

Steering System Defects (See Figure 2-1)

- Missing nuts, bolts, cotter keys or other parts.
- Bent, loose, or broken parts, such as steering column, steering gear box, or tie rods.
- If power steering equipped -- hoses, pumps, and fluid level; check for leaks.
- Steering wheel play of more than 10 degrees (approximately 2 inches movement at the rim of a 20-inch steering wheel) can make it hard to steer.

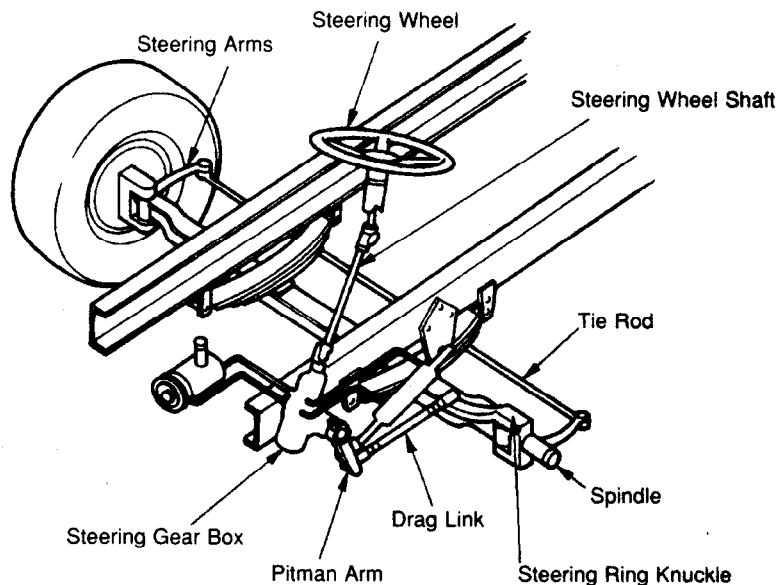


Figure 2-1
Examples of Steering System
Key Parts

Suspension Systems Defects. The suspension system holds up the vehicle and its load. It keeps the axles in place. Therefore broken suspension parts can be extremely dangerous. You should check for:

- Spring hangers (Figure 2-2) that allow movement of axle from proper position
- Cracked or broken spring hangers.
- Missing or broken leaves in any leaf spring. If one fourth or more are missing, it will put the vehicle "out of service" but any defect could be dangerous (Figure 2-3).
- Broken leaves in a multi-leaf spring or leaves that have shifted so they might hit a tire or other part.
- Leaking shock absorbers (Figure 2-4).
- Torque rod or arm, U-bolts, spring hangers or other axle positioning parts that are cracked, damaged, or missing (Figure 2-2 and 2-4).
- Air suspension systems that are damaged and/or leaking.
- Any loose, cracked, broken or missing frame members.

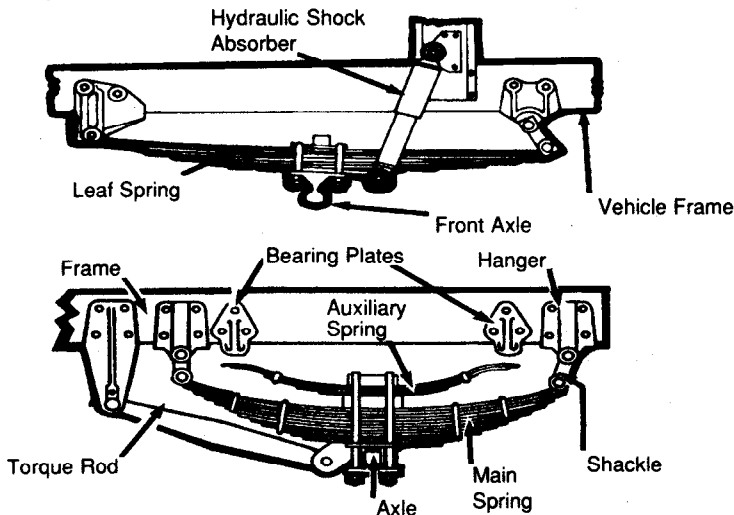


Figure 2-2
Key Suspension Parts

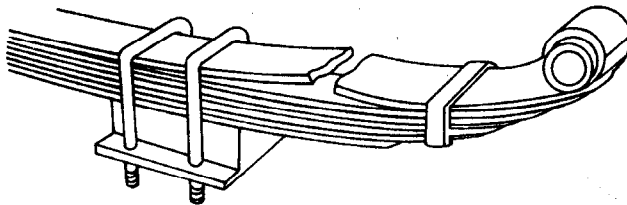


Figure 2-3
Safety Defect:
Broken Leaf in Leaf Spring

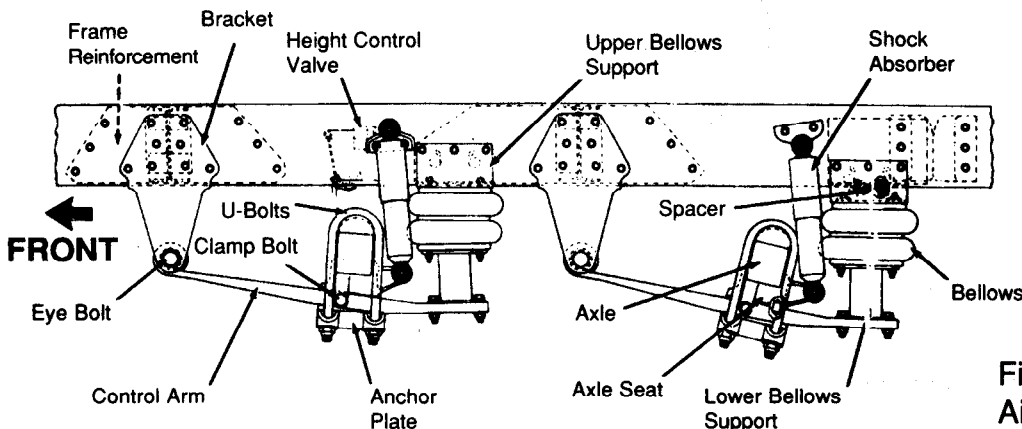


Figure 2-4
Air Suspension Parts

Exhaust System Defects. A broken exhaust system can let poison fumes into the cab or sleeper berth. You should check for:

- Loose, broken, or missing exhaust pipes, mufflers, tailpipes or vertical stacks.
- Loose, broken, or missing mounting brackets, clamps, bolts or nuts.
- Exhaust system parts rubbing against fuel system parts, tires or other moving parts of vehicle.
- Exhaust system parts that are leaking.

Emergency Equipment. Vehicles should be equipped with emergency equipment:

- Fire extinguisher(s).
- Spare electrical fuses (unless equipped with circuit breakers).
- Warning devices for parked vehicles (for example, three reflective warning triangles).

Cargo (Trucks). You must inspect for cargo overloading and correct balance and securement before each trip. If the cargo contains hazardous materials, you must inspect for proper papers and placarding.

A 7-Step Inspection Method

Method of inspecting. You should do a pretrip inspection the same way each time so you will learn all the steps and be less likely to forget something. The following seven-step procedure should be a useful guide. Memory aids are shown in Figures 2-5, 2-6, and 2-7. They may help you remember important things to inspect. You can cut them out and bring them with you when you take your CDL test. When you take your test you must explain to the examiner what parts of the vehicle you are inspecting. Describe the possible defects you are looking for. It will help you pass the test if you practice this with a friend beforehand. You will be marked down for important items on your vehicle that you fail to inspect.

1: Vehicle Overview

Approaching the vehicle. Notice general condition. Look for damage or vehicle leaning to one side. Look under the vehicle for fresh oil, coolant, grease or fuel leaks. Check the area around the vehicle for hazards to vehicle movement (people, other vehicles, objects, low hanging wires or limbs, etc.)

Review last vehicle inspection report. Drivers may have to make a vehicle inspection report in writing each day. The vehicle owner should repair any items in the report that affects safety. You should look at the last report to find out what was the matter, if anything. Inspect the vehicle to find out if problems were fixed.

Test Your Knowledge

1. What is the most important reason for doing vehicle inspections?
2. What things should you check during a trip?
3. Name some key steering system parts.
4. Name some suspension system defects.
5. What three kinds of emergency equipment must you have?
6. What is the minimum tread depth for front tires?
7. -- For other tires?

These questions may be on the test. If you can't answer all, reread the last four pages.

Vehicle Inspection Memory Aids (Key Locations To Inspect)

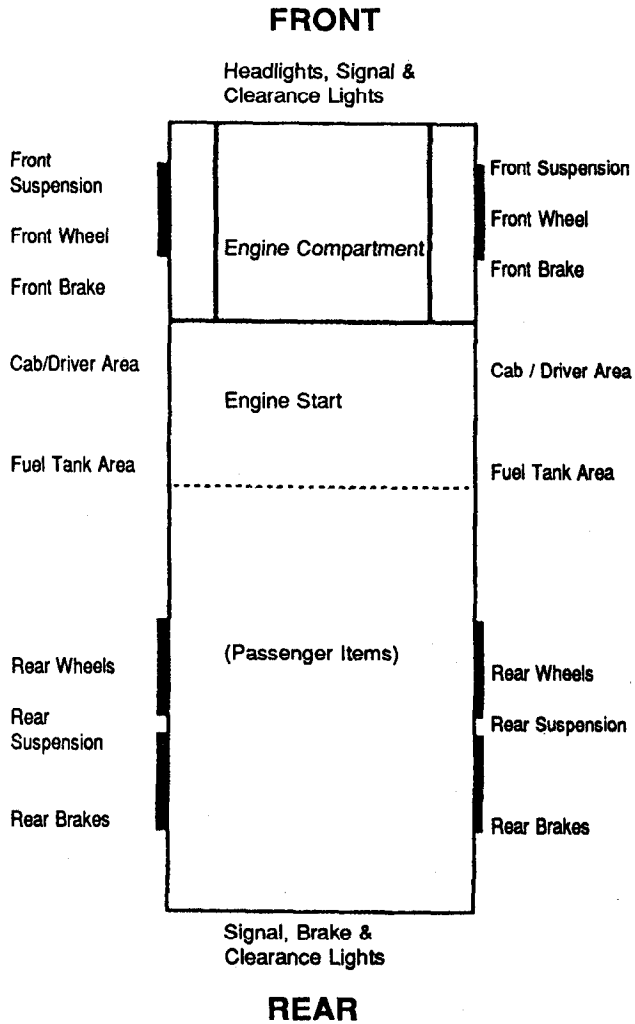


Figure 2-5. Straight Truck / School Bus

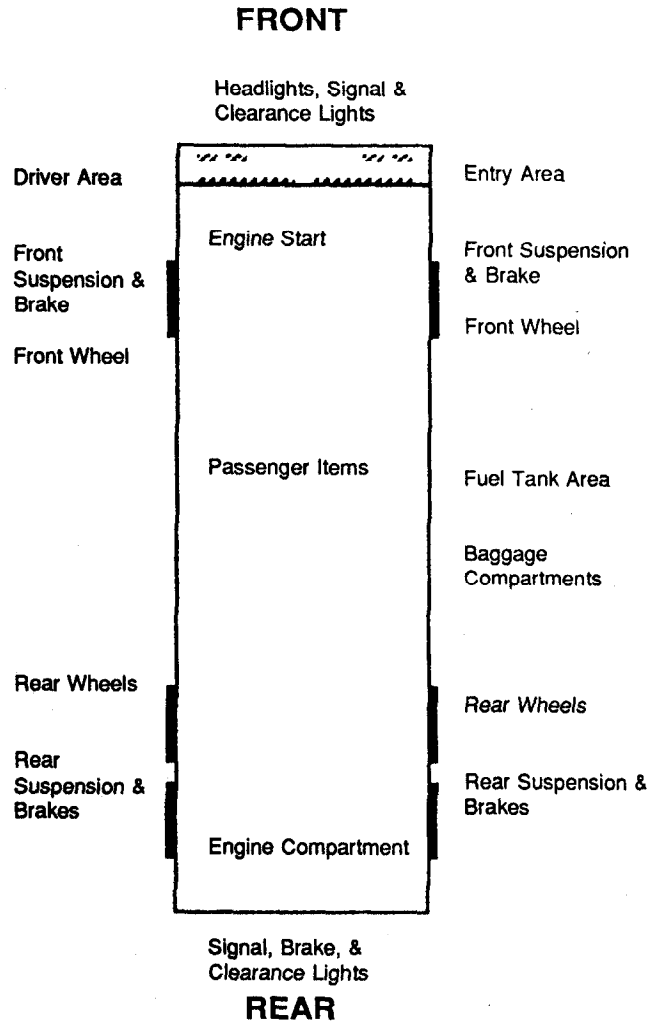


Figure 2-6. Coach / Transit Bus

Safety note: Always put vehicle key in your pocket -- or someone might move the vehicle while you are checking underneath it.

Vehicle Inspection Memory Aids (Key Locations To Inspect)

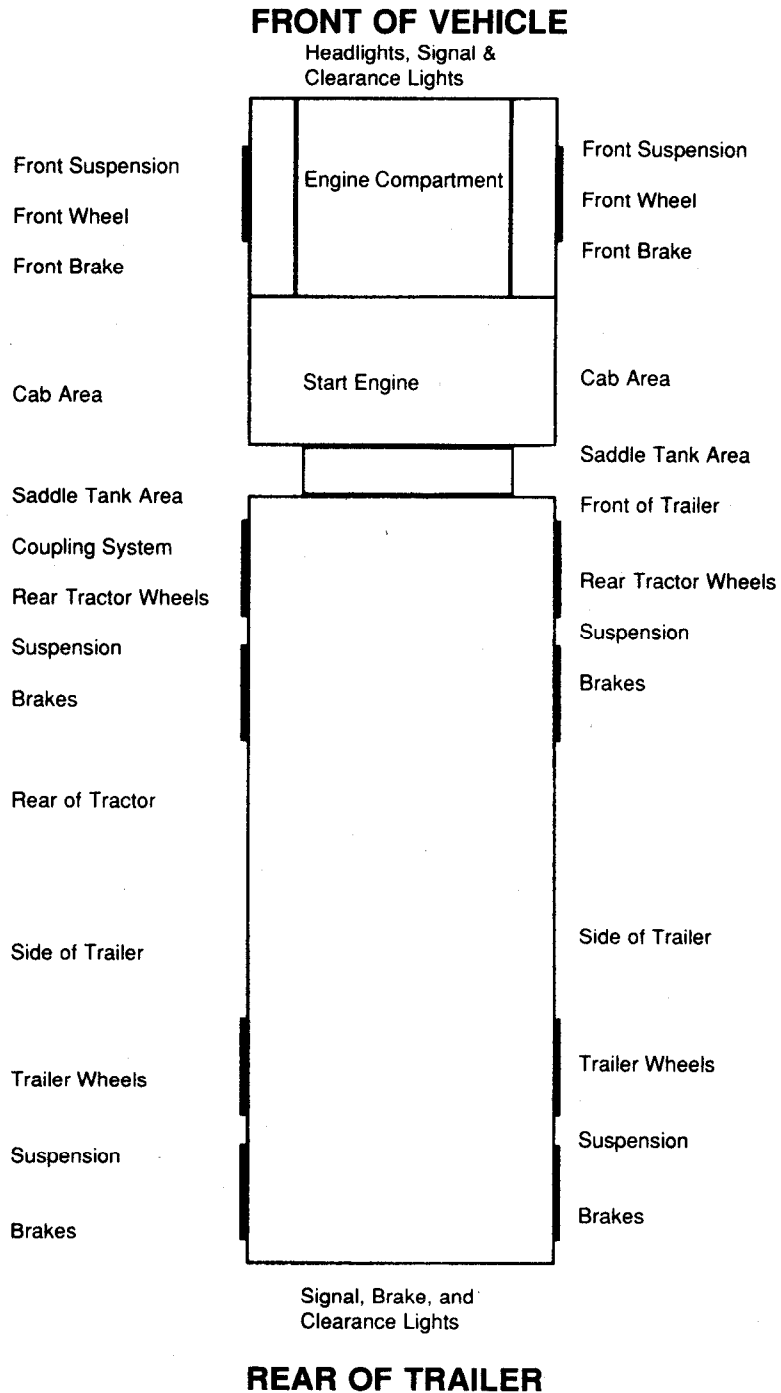


Figure 2-7. Tractor - Trailer

Safety note: If you are parked on a street, walk around so you are facing the oncoming traffic. Pay attention so you don't get run over.

Check that the parking brakes are on and/or wheels chocked. You may have to raise the hood, tilt the cab (secure loose things so they don't fall and break something), or open the engine compartment door. Check the following:

- Engine oil level.
- Coolant level in radiator; condition of hoses.
- Power steering fluid level; hose condition (if so equipped).
- Windshield washer fluid level.
- Battery fluid level, connections and tie downs (battery may be located elsewhere).
- Automatic transmission fluid level (may require engine to be running).
- Check belts for tightness and excessive wear (alternator, water pump, air compressor) -- learn how much "give" the belts should have when adjusted right, and check each one.
- Leaks in the engine compartment (fuel, coolant, oil, power steering fluid, hydraulic fluid, battery fluid).
- Cracked, worn electrical wiring insulation.

Lower and secure hood, cab, or engine compartment door.

Get in and Start Engine

- Make sure parking brake is on.
- Put gearshift in neutral (or "park" if automatic).
- Start engine; listen for unusual noises.

Look at the Gauges

- **Oil pressure.** Should come up to normal within seconds after engine is started.
- **Ammeter and/or voltmeter.** Should be in normal range(s).
- **Coolant temperature.** Should begin gradual rise to normal operating range.
- **Engine oil temperature.** Should begin gradual rise to normal operating range.
- **Warning lights and buzzers.** Oil, coolant, charging circuit warning lights should go out right away.

Check Condition of Controls. Check all of the following for looseness, sticking, damage, or improper setting

- Steering wheel.
- Clutch.
- Accelerator ("gas pedal").
- Brake controls.
 - Foot brake.
 - Trailer brake (if vehicle has one).
 - Parking brake.
 - Retarder controls (if vehicle has them).
- Transmission controls.
- Interaxle differential lock (if vehicle has one).
- Horn(s).
- Windshield wiper/washer.
- Lights.
 - Headlights.
 - Dimmer switch.
 - Turn signal.
 - 4-way flashers.
 - Clearance, identification, marker light switch(s).

2: Check Engine Compartment

3: Start Engine and Inspect Inside the Cab

Check Mirrors and Windshield. Inspect mirrors and windshield for cracks, dirt, illegal stickers or other obstructions to seeing. Clean and adjust as necessary.

Check Emergency Equipment

- Check for safety equipment:
 - Spare electrical fuses (unless vehicle has circuit breakers).
 - Three red reflective triangles.
 - Properly charged and rated fire extinguisher.
- Check for optional items such as:
 - Tire chains (where winter conditions require them).
 - Tire changing equipment.
 - List of emergency phone numbers.
 - Accident reporting kit (packet).

**4: Turn Off Engine
and Check Lights**

Make sure the parking brake is set, turn off the engine, and take the key with you. Turn on headlights (low beams) and four way flashers, and get out.

- Go to front of vehicle and check that low beams are on and both of the four-way flashers are working.
- Push dimmer switch and check that high beams work.
- Turn off headlights and four-way hazard warning flashers.
- Turn on parking, clearance, side-marker and identification lights.
- Turn on right turn signal, and start walkaround inspection.

5: Do Walkaround Inspection

General

- Walk around and inspect.
- Clean all lights, reflectors and glass as you go along.

Left Front Side

- Driver's door glass should be clean.
- Door latches or lock work properly.
- Left front wheel.
 - Condition of wheel and rim -- missing, bent, broken studs, clamps, lugs, any signs of misalignment.
 - Condition of tires -- properly inflated, valve stem and cap OK, no serious cuts, bulges, tread wear.
 - Use wrench to test rust streaked lug nuts, indicating looseness.
 - Hub oil level ok, no leaks.
- Left front suspension.
 - Condition of spring, spring hangers, shackles, u-bolts.
 - Shock absorber condition.
- Left front brake.
 - Condition of brake drum.
 - Condition of hoses.

Front

- Condition of front axle.
- Condition of steering system.
 - No loose, worn, bent, damaged or missing parts.
 - Must grab steering mechanism to test for looseness.
- Condition of windshield.
 - Check for damage and clean if dirty.
 - Check windshield wiper arms for proper spring tension.
 - Check wiper blades for damage, "stiff" rubber, and securement.

- Lights and reflectors.
 - Parking, clearance and identification lights clean, operating and proper color (amber at front).
 - Reflectors clean and proper color (amber at front).
- Right front turn signal light clean, operating, and proper color (amber or white on signals facing forward).

Right Side

- Right front: check all items as done on left front.
- Primary and safety cab locks engaged (if cab-over-engine design).
- Right fuel tank(s).
 - Securely mounted, not damaged or leaking.
 - Fuel crossover line secure.
 - Tank(s) contain enough fuel.
 - Cap(s) on and secure.
- Condition of visible parts.
 - Rear of engine -- not leaking.
 - Transmission -- not leaking.
 - Exhaust system -- secure, not leaking, not touching wires, fuel or air lines.
 - Frame and cross members -- no bends, cracks.
 - Air lines and electrical wiring -- secured against snagging, rubbing, wearing.
 - Spare tire carrier or rack not damaged (if so equipped).
 - Spare tire and/or wheel securely mounted in rack.
 - Spare tire and wheel adequate (proper size, properly inflated).
- Cargo securement (trucks).
 - Cargo properly blocked, braced, tied, chained, etc.
 - Header board adequate, secure (if required).
 - Side boards, stakes strong enough, free of damage, properly set in place (if so equipped).
 - Canvas or tarp (if required) properly secured to prevent tearing, billowing or blocking of mirrors.
 - If oversize, all required signs must be safely and properly mounted and all required permits in driver's possession.
 - Curbside cargo compartment doors securely closed, latched/locked, required security seals in place.

Right Rear

- Condition of wheels and rims -- no missing, bent, broken spacers, studs, clamps, lugs.
- Condition of tires -- properly inflated, valve stems and caps OK, no serious cuts, bulges, tread wear, tires not rubbing each other and nothing stuck between them.
- Tires same type, e.g., not mixed radial and bias types.
- Tires evenly matched (same sizes).
- Wheel bearing/seals not leaking.
- Suspension.
 - Condition of spring(s), spring hangers, shackles and U-bolts
 - Axle secure.
 - Powered axle(s) not leaking lube (gear oil).
 - Condition of torque rod arms, bushings.
 - Condition of shock absorber(s).
 - If retractable axle equipped, check condition of lift mechanism, if air powered check for leaks.

- Brakes.
 - Condition of brake drum(s).
 - Condition of hoses - look for any wear due to rubbing.
- Lights and reflectors.
 - Side-marker lights clean, operating and proper color (red at rear, others amber).
 - Side-marker reflectors clean and proper color (red at rear, others amber).

Rear

- Lights and reflectors.
 - Rear clearance and identification lights clean, operating and proper color (red at rear).
 - Reflectors clean and proper color (red at rear).
 - Taillights clean, operating and proper color (red at rear).
 - Right rear turn signal operating, and proper color (red, yellow, or amber at rear).
- License plate(s) present, clean and secured.
- Splash guards present, not damaged, properly fastened, not dragging on ground or rubbing tires.
- Cargo secure (trucks).
 - Cargo properly blocked, braced, tied, chained, etc.
 - Tailboards up and properly secured.
 - End gates free of damage, properly secured in stake sockets.
 - Canvas or tarp (if required) properly secured to prevent tearing, billowing to block either the rearview mirrors or to cover rear lights.
 - If over-length, or over-width, make sure all signs and/or additional lights/flags are safely and properly mounted and all required permits are in driver's possession.
 - Rear doors securely closed, latched/locked.

Left Side

- Check all items as done on right side, plus:
 - Battery (if not mounted in engine compartment).
 - Battery box securely mounted to vehicle.
 - Box has secure cover.
 - Battery(s) secured against movement.
 - Battery(s) not broken or leaking
 - Fluid in battery(s) at proper level (except maintenance-free type).
 - Cell caps present and securely tightened (except maintenance-free type).
 - Vents in cell caps free of foreign material (except maintenance-free type).

Check Signal Lights

Get In and Turn Off Lights.

- Turn off all lights.
- Turn on stop lights (apply trailer hand brake, or have a helper put on the brake pedal).
- Turn on left turn signal lights.

Get Out and Check Lights.

- Left front turn signal light clean, operating and proper color (amber or white on signals facing the front).
- Left rear turn signal light and both stop lights clean, operating and proper color (red, yellow, or amber).

Get In Vehicle.

- Turn off lights not needed for driving.
- Check for all required papers, trip manifests, permits, etc.
- Secure all loose articles in cab (they might interfere with operation of the controls, or hit you in a crash).
- Start the engine.

7: Start the Engine and Check Brake System

Test For Hydraulic Leaks. If the vehicle has hydraulic brakes, pump the brake pedal three times. Then apply firm pressure to the pedal and hold for five seconds. The pedal should not move. If it does, there may be a leak or other problem. Get it fixed before driving.

If the vehicle has air brakes, do the checks described in Sections 5 and 6 of this manual.

Test Parking Brake

- Fasten seat belt.
- Allow vehicle to move forward **slowly**.
- Apply parking brake.
- If it doesn't stop vehicle, it is faulty; get it fixed.

Test Service Brake Stopping Action

- Go about five miles per hour.
- Push brake pedal firmly.
- "Pulling" to one side or the other can mean brake trouble.
- Any unusual brake pedal "feel" or delayed stopping action can mean trouble.

This completes the pretrip inspection.

If you find anything unsafe during the pretrip inspection, get it fixed. Federal and state laws forbid operating an unsafe vehicle.

Test Your Knowledge

1. Name some things you should check on the front of your vehicle during the walkaround inspection.
2. What should wheel bearing seals be checked for?
3. How many red reflective triangles should you carry?
4. How do you test hydraulic brakes for leaks?
5. Can you bring the "Vehicle inspection memory aid" with you to the test?
6. Why put the starter switch key in your pocket during the pretrip inspection?

These questions may be on the test. If you can't answer all, read about the 7 step inspection method.

Check Vehicle Operation Regularly

You should check:

- Instruments.
- Air pressure gauge (if you have air brakes).
- Temperature gauges.
- Pressure gauges.
- Ammeter/voltmeter.
- Mirrors.
- Tires.
- Cargo, cargo covers.

If you see, hear, smell, or feel anything that might mean trouble, check it out.

Safety Inspection

- Drivers of trucks and truck tractors must inspect within the first 25 miles of a trip and every 150 miles or every 3 hours (whichever comes first) afterward.
- Check these things
 - Cargo doors and/or cargo securement.
 - Tires -- Enough air pressure; not overheated.
 - Brakes -- not overheated (put back of hand near brake drums to test).
 - Coupling devices.

**After-Trip
Inspection & Report**

You may have to make a written report each day on the condition of the vehicle(s) you drove. Report anything affecting safety or possibly leading to mechanical breakdown.

The vehicle inspection report tells the vehicle owner about problems that may need fixing. Keep a copy of your report in the vehicle for one day. That way, the next driver can learn about any problems you have found.

**2.2 Basic Control
of Your Vehicle**

To drive a vehicle safely, you must be able to control its speed and direction. Safe operation of a commercial vehicle requires skill in:

- Accelerating.
- Steering.
- Shifting gears.
- Braking.

Fasten your seatbelt when on the road. Apply the parking brake when you leave your vehicle.

Accelerating

Don't roll back when you start. You may hit someone behind you. Partly engage the clutch before you take your right foot off the brake. Put on the parking brake whenever necessary to keep from rolling back. Release the parking brake only when you have applied enough engine power to keep from rolling back.

Speed up smoothly and gradually so the vehicle does not jerk. Rough acceleration can cause mechanical damage. When pulling a trailer, rough acceleration can damage the coupling.

Speed up very gradually when traction is poor, as in rain or snow. If you use too much power, the drive wheels may spin. You could lose control. If the drive wheels begin to spin, take your foot off the accelerator.

Hold the Wheel Right. Hold the steering wheel firmly with both hands. Your hands should be on opposite sides of the wheel. If you hit a curb or a pothole (chuckhole), the wheel could pull away from your hands unless you have a firm hold.

Backing with a Trailer. When backing a car, straight truck or bus you turn the top of the steering wheel toward the direction you want to go. When backing a trailer, you turn the steering wheel in the opposite direction. Once the trailer starts to turn, you must turn the wheel the other way to follow the trailer.

Whenever you back with a trailer, try to position your vehicle so you can back in a straight line. If you must back on a curved path, back to the driver's side so you can see.

Back slowly. This will let you make corrections before you get too far off course.

Use the mirrors. The mirrors will help you see whether the trailer is drifting to one side or the other.

Correct drift immediately. As soon as you see the trailer getting off the proper path, correct it by turning the top of the steering wheel in the direction of the drift.

Pull forward. When backing a trailer, make pull-ups to reposition your vehicle as needed.

Because you cannot see everything behind your vehicle, **backing is always dangerous.** Avoid backing whenever you can. When you park, try to park so you will be able to pull forward when you leave. When you have to back, here are a few simple safety rules:

- Look at your path.
- Back slowly.
- Back and turn toward the driver's side whenever possible.
- Use a helper whenever possible.

These rules are discussed in turn below.

Look at Your Path. Look at your line of travel **before** you begin. Get out and walk around the vehicle. Check your clearance to the sides and overhead in and near the path your vehicle will take.

Back Slowly. Always back as slowly as possible. Use the lowest reverse gear. That way you can more easily correct any steering errors. You also can stop quickly if necessary.

Back and Turn Toward the Driver's Side. Back to the driver's side so you can see better. Backing toward the right side is very dangerous because you can't see as well. If you back and turn toward the driver's side, you can watch the rear of your vehicle by looking out the side window. Use driver-side backing -- even if it means going around the block to put your vehicle in this position. The added safety is worth it.

· **Steering**

· **Backing with a Trailer**

· **Backing Safely**

Use a Helper. Use a helper when you can. There are blind spots you can't see. That's why a helper is important.

The helper should stand near the back of your vehicle where you can see the helper. Before you begin backing, work out a set of hand signals that you both understand. Agree on a signal for "stop".

2.3 Shifting Gears

Manual Transmissions

Correct shifting of gears is important. If you can't get your vehicle into the right gear while driving, you will have less control.

Basic Method for Shifting Up. Most heavy vehicles with manual transmissions require double clutching to change gears. This is the basic method:

1. Release accelerator, push in clutch and shift to neutral at the same time.
2. Release clutch.
3. Let engine and gears **slow down** to the RPM required for the next gear (this takes practice).
4. Push in clutch and shift to the higher gear at the same time.
5. Release clutch and press accelerator at the same time.

Shifting gears using double clutching requires practice. If you remain too long in neutral, you may have difficulty putting the vehicle into the next gear. If so, don't try to force it. Return to neutral, release clutch, increase engine speed to match road speed, and try again.

Knowing When to Shift Up. There are two ways of knowing when to shift:

Use engine speed (RPM). Study the driver's manual for your vehicle and learn the operating RPM range. Watch your tachometer, and shift up when your engine reaches the top of the range. (Some newer vehicles use "progressive" shifting: the RPM at which you shift becomes higher as you move up in the gears. Find out what's right for the vehicle you will operate.)

Use road speed (mph). Learn what speeds each gear is good for. Then, by using the speedometer, you'll know when to shift up.

With either method, you may learn to use engine sounds to know when to shift.

Test Your Knowledge

1. Why should you back toward the driver's side?
2. What is a pull-up?
3. If stopped on a hill, how can you start moving without rolling back?
4. When backing, why is it important to use a helper?
5. What's the most important hand signal that you and the helper should agree on?

These questions may be on the test. If you can't answer all, reread 2.2: Basic Control of your Vehicle.

Basic Procedures for Shifting Down

1. Release accelerator, push in clutch and shift to neutral at the same time.
2. Release clutch.
3. Press accelerator, **increase** engine and gear speed to the RPM required in the lower gear.
4. Push in clutch and shift to lower gear at the same time.
5. Release clutch and press accelerator at the same time.

Downshifting, like upshifting, requires knowing when to shift. Use either the tachometer or the speedometer and downshift at the right RPM or road speed.

Special conditions where you should downshift are:

Before starting down a hill. Slow down and shift down to a speed that you can control without using the brakes hard. Otherwise the brakes can overheat and lose their braking power. Downshift **before** starting down the hill. Make sure you are in a low enough gear, usually lower than the gear required to climb the same hill.

Before entering a curve. Slow down to a safe speed, and downshift to the right gear before entering the curve. This lets you use some power through the curve to help the vehicle be more stable while turning. It also lets you speed up as soon as you are out of the curve.

Multi-speed rear axles and auxiliary transmissions are used on many vehicles to provide extra gears. You usually control them by a selector knob or switch on the gearshift lever of the main transmission. There are many different shift patterns. Learn the right way to shift gears in the vehicle you will drive.

• **Multi-Speed Rear Axles
and
Auxiliary Transmissions**

Some vehicles have automatic transmissions. You can select a low range to get greater engine braking when going down grades. The lower ranges prevent the transmission from shifting up beyond the selected gear (unless the governor RPM is exceeded). It is very important to use this braking effect when going down grades.

• **Automatic Transmissions**

Some vehicles have "retarders." Retarders help slow a vehicle, reducing the need for using your brakes. They reduce brake wear and give you another way to slow down. There are many types of retarders (exhaust, engine, hydraulic, electric). All retarders can be turned on or off by the driver. On some the retarding power can be adjusted. When turned "on," retarders apply their braking power (to the drive wheels only) whenever you let up on the accelerator pedal all the way.

• **Retarders**

Caution. When your drive wheels have poor traction, the retarder may cause them to skid. Therefore you should turn the retarder off whenever the road is wet, icy or snow covered.

Test Your Knowledge

1. What are the two special conditions where you should downshift?
2. When should you downshift automatic transmissions?
3. Retarders keep you from skidding when the road is slippery. True or false?
4. What are two ways to know when to shift?

These questions may be on the test. If you can't answer all, reread 2.3: Shifting Gears.

2.4 Seeing

Seeing Ahead

To be a safe driver you need to know what's going on all around your vehicle. Not looking properly is a major cause of accidents.

All drivers look ahead; but many don't look **far enough** ahead.

Importance of Looking Far Enough Ahead. Because stopping or changing lanes can take a lot of distance, knowing what the traffic is doing on all sides of you is very important. You need to look well ahead to make sure you have room to make these moves safely.

How Far Ahead to Look. Most good drivers look 12 to 15 seconds ahead. That means looking ahead the distance you will travel in 12 to 15 seconds. At lower speeds, that's about one block. At highway speeds it's about a quarter of a mile. If you're not looking that far ahead, you may have to stop too quickly or make quick lane changes. Looking 12 to 15 seconds ahead doesn't mean not paying attention to things that are closer. Good drivers shift their attention back and forth, near and far.

Look for Traffic. Look for vehicles coming onto the highway or into your lane or turning. Watch for brakelights from slowing vehicles. By seeing these things far enough ahead, you can change your speed or change lanes if necessary to avoid a problem.

Look for Road conditions. Look for hills and curves--anything you'll have to slow or change lanes for. Pay attention to traffic signals and signs. If a light has been green for a long time, it will probably change before you get there. Start slowing down and be ready to stop. Traffic signs may alert you to road conditions where you may have to change speed.

Seeing to the Sides and Rear

It's important to know what's going on behind and to the sides. Check your mirrors regularly. Check more often in special situations.

Regular Checks. You need to make regular checks of your mirrors to be aware of traffic and to check your vehicle.

Traffic. Check the mirrors for vehicles on either side and in back of you. In an emergency, you may need to know whether you can make a quick lane change. Use your mirrors to spot overtaking vehicles. There are "blind spots" that your mirrors cannot show you. Check your mirrors regularly to know where other vehicles are around you, and to see if they move into your blind spots.

Check your vehicle. Use the mirrors to keep an eye on your tires. It's one way to spot a tire fire. If you're carrying open cargo, you can use the mirrors to check it. Look for loose straps, ropes or chains. Watch for a flapping or ballooning tarp.

Special Situations. Special situations require more than regular mirror checks. These are lane changes, turns, merges, and tight maneuvers.

Lane changes. You need to check your mirror to make sure no one is alongside you or about to pass you. Check your mirrors:

- Before you change lanes to make sure there is enough room.
- After you have signaled, to check that no one has moved out of your blind spot.

- Right after you start the lane change to double-check that your path is clear.
- After you complete the lane change.

Turns. In turns, check your mirrors to make sure the rear of your vehicle will not hit anything.

Merges. When merging, use your mirrors to make sure the gap in traffic is large enough for you to enter safely.

Tight maneuvers. Any time you are driving in close quarters check your mirrors often. Make sure you have enough clearance.

How to Use Mirrors. Use mirrors correctly by checking them quickly and understanding what you see.

Checking quickly. When you use your mirrors while driving on the road, check quickly. Look back and forth between the mirrors and the road ahead. Don't focus on the mirrors for too long. Otherwise, you will travel quite a distance without knowing what's happening ahead.

Understanding what you see. Many large vehicles have curved (convex, "fisheye," "spot," "bugeye") mirrors that show a wider area than flat mirrors. This is often helpful. But everything appears smaller in a convex mirror than it would if you were looking at it directly. Things also seem farther away than they really are. It's important to realize this and to allow for it.

Other drivers can't know what you are going to do until you tell them.

2.5 Communicating

Signaling what you intend to do is important for safety. Here are some general rules for signaling.

• *Signal Your Intentions*

Turns. There are three good rules for using turn signals.

1. Signal early. Signal well before you turn. It is the best way to keep others from trying to pass you.
2. Signal continuously. You need both hands on the wheel to turn safely. Don't cancel the signal until you have completed the turn.
3. Cancel your signal. Don't forget to turn off your turn signal after you've turned (if you don't have self-cancelling signals).

Lane Changes. Put your turn signal on before changing lanes. Change lanes slowly and smoothly. That way a driver you didn't see may have a chance to honk his/her horn or avoid your vehicle.

Slowing Down. Warn drivers behind you when you see you'll need to slow down. A few light taps on the brake pedal -- enough to flash the brake lights -- should warn following drivers. Use the 4-way emergency flashers for times when you are driving very slow or are stopped. Warn other drivers in any of the following situations:

Trouble ahead. The size of your vehicle may make it hard for drivers behind you to see hazards ahead. If you see a hazard that will require slowing down, warn the drivers behind by flashing your brake lights.

Tight turns. Most car drivers don't know how slow you have to go to make a tight turn in a large vehicle. Give drivers behind you warning by braking early and slowing gradually.

Stopping on the road. Truck and bus drivers sometimes stop in the road to unload cargo or passengers or to stop at a railroad crossing. Warn following drivers by flashing your brake lights. Don't stop suddenly.

Driving Slowly. Drivers often do not realize how fast they are catching up to a slow vehicle until they are very close. If you must drive slowly, alert following drivers by turning on your emergency flashers if it is legal. (Laws regarding the use of flashers differ from one state to another. Check the laws of the states where you will drive.)

Don't Direct Traffic. Some drivers try to help out others by signaling when it is safe to pass. You should not do this. You could cause an accident. You could be blamed and it could cost you many thousands of dollars.

Communicating Your Presence

Other drivers may not notice your vehicle even when it's in plain sight. Let them know you're there to help prevent accidents.

When Passing. Whenever you are about to pass a vehicle, pedestrian, or bicyclist, assume they don't see you. They could suddenly move in front of you. When it is legal, tap the horn lightly or, at night, flash your lights from low to high beam and back. And drive carefully enough to avoid a crash even if they don't see or hear you.

When It's Hard to See. At dawn or dusk or in rain or snow, you need to make yourself easier to see. If you are having trouble seeing other vehicles, other drivers will have trouble seeing you. Turn on your lights. Use the headlights, not just the identification or clearance lights. Use the low beams; high beams can bother people in the daytime as at night.

When Parked At the Side of the Road. When you pull off the road and stop, be sure to turn on the 4-way emergency flashers. This is important at night. Don't trust the taillights to give warning. Drivers have crashed into the rear of a parked vehicle because they thought it was moving normally.

If you must stop on a road or the shoulder of a road, you should put out your reflective triangles within ten minutes. Place your warning devices at the following locations:

- On the traffic side of the vehicle, within ten feet of the front or rear corners -- to mark the location of the vehicle. (See Figure 2-8.)
- About 100 feet behind and ahead of the vehicle, on the shoulder or in the lane you are stopped in. (See Figure 2-8.)

- Back beyond any hill, curve, or other obstruction that prevents other drivers from seeing the vehicle within 500 feet. (See Figure 2-9.)
- If you must stop on or by a one-way or divided highway, place warning devices 10 feet, 100 feet, and 200 feet toward the approaching traffic. (See Figure 2-10.)

When putting out the triangles hold them between yourself and the oncoming traffic for your own safety. (So other drivers can see you.)

Use Your Horn When Needed. Your horn can let others know you're there. It can help to avoid a crash. Use your horn when needed. However, it can startle others and could be dangerous when used unnecessarily.

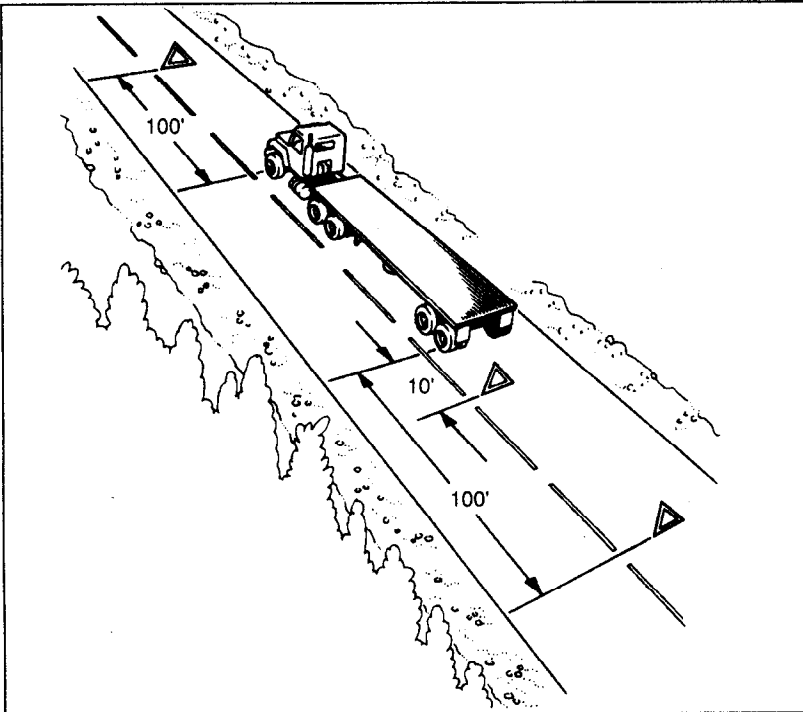


Figure 2-8
Warning Device Placement:
Two Lane or Undivided Highway

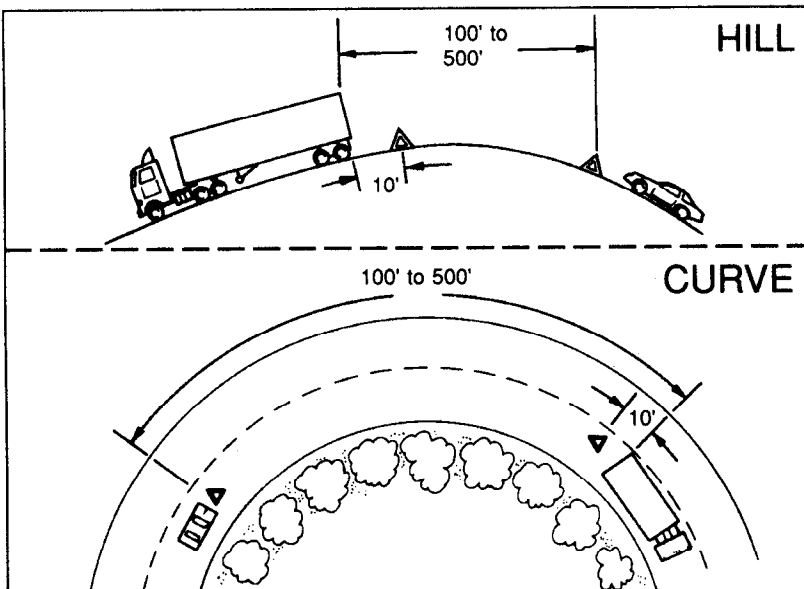
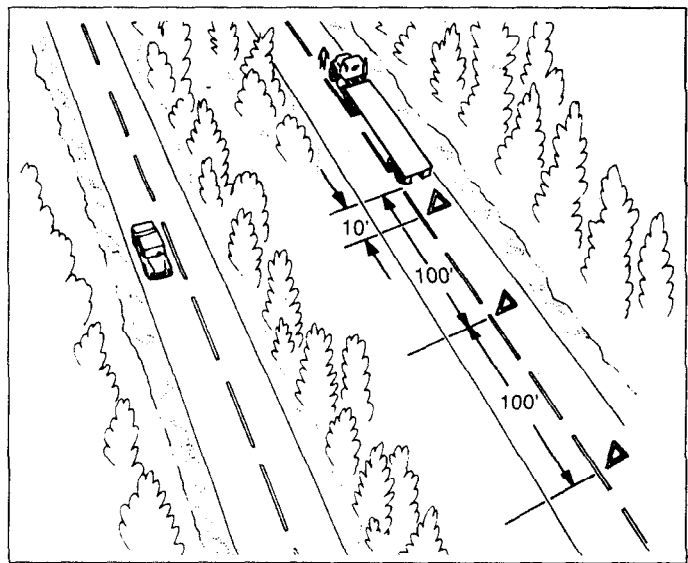


Figure 2-9.
Warning Device Placement:
Obstructed View

Figure 2-10.
Warning Device Placement:
One Way or Divided Highway



2.6 Controlling Speed

Speed and Stopping Distance

Driving too fast is a major cause of fatal crashes. You must adjust your speed depending on driving conditions. These include traction, curves, visibility, traffic, and hills.

There are three things that add up to total stopping distance:

$$\begin{array}{r} \text{Perception Distance} \\ + \text{Reaction Distance} \\ + \text{Braking Distance} \\ \hline = \text{Total Stopping Distance} \end{array}$$

- **Perception distance.** This is the distance your vehicle travels from the time your eyes see a hazard until your brain recognizes it. The perception time for an alert driver is about 3/4 second. At 55 mph, you travel 60 feet in 3/4 second.
- **Reaction distance.** The distance traveled from the time your brain tells your foot to move from the accelerator until your foot is actually pushing the brake pedal. The average driver has a reaction time of 3/4 second. This accounts for an additional 60 feet traveled at 55 mph.
- **Braking distance.** The distance it takes to stop once the brakes are put on. At 55 mph on dry pavement with good brakes it can take a heavy vehicle about 170 feet to stop. It takes about 4 1/2 seconds.
- **Total stopping distance.** At 55 mph it will take about 6 seconds to stop and your vehicle will travel about the distance of a football field. (60 + 60 + 170 = 290 feet).

The effect of speed on stopping distance. Whenever you double your speed, it takes about **four** times as much distance to stop and your vehicle will have **four** times the destructive power if it crashes. High speeds increase stopping distances greatly. By slowing down a little, you can gain a lot in reduced braking distance.

The effect of vehicle weight on stopping distance. The heavier the vehicle, the more work the brakes must do to stop it and the more heat they absorb. But the brakes, tires, springs, and shock absorbers on heavy vehicles are designed to work best when the vehicle is

fully loaded. **Empty** trucks require **greater** stopping distances, because an empty vehicle has less traction. It can bounce and lock up its wheels, giving much poorer braking. (This is not usually the case with buses.)

You can't steer or brake a vehicle unless you have traction. Traction is friction between the tires and the road. There are some road conditions that reduce traction and call for lower speeds.

Matching Speed to the Road Surface

Slippery Surfaces. It will take longer to stop and it will be harder to turn without skidding when the road is slippery. You must drive slower to be able to stop in the same distance as on a dry road. Wet roads can double stopping distance. Reduce speed by about one third (e.g., slow from 55 to about 35 mph) on a wet road. On packed snow, reduce speed by a half, or more. If the surface is icy, reduce speed to a crawl and stop driving as soon as you can safely do so.

Identifying Slippery Surfaces. Sometimes it's hard to know if the road is slippery. Here are some signs of slippery roads.

Shaded areas. Shady parts of the road will remain icy and slippery long after open areas have melted.

Bridges. When the temperature drops, bridges will freeze before the road will. Be especially careful when the temperature is close to 32 degrees F.

Melting ice. Slight melting will make ice wet. Wet ice is much more slippery than ice that is not wet.

Black ice. Black ice is a thin layer that is clear enough that you can see the road underneath it. It makes the road look wet. Any time the temperature is below freezing and the road looks wet, watch out for black ice.

Vehicle icing. An easy way to check for ice is to open the window and feel the front of the mirror, mirror support, or antenna. If there's ice on these, the road surface is probably starting to ice up.

Just after rain begins. Right after it starts to rain, the water mixes with oil left on the road by vehicles. This makes the road very slippery. If the rain continues, it will wash the oil away.

Hydroplaning. In some weather, water or slush collects on the road. When this happens, your vehicle can hydroplane. It's like water skiing: the tires lose their contact with the road and have little or no traction. You may not be able to steer or brake. You can regain control by releasing the accelerator and pushing in the clutch. This will slow your vehicle and let the wheels turn freely. If the vehicle is hydroplaning, do not use the brakes to slow down. If the drive wheels start to skid, push in the clutch to let them turn freely.

It does not take a lot of water to cause hydroplaning. Hydroplaning can occur at speeds as low as 30 mph if there is a lot of water. Hydroplaning is more likely if tire pressure is low or the tread is worn. (The grooves in a tire carry away the water; if they aren't deep they don't work well.) Be especially careful driving through puddles. The water is often deep enough to cause hydroplaning.

Speed and Curves

Drivers must adjust their speed for curves in the road. If you take a curve too fast, two things can happen. The wheels can lose their traction and continue straight ahead, so you skid off the road. Or, the wheels may keep their traction and the vehicle rolls over. Tests have shown that trucks with a high center of gravity can roll over at the posted speed limit for a curve.

Slow to a safe speed **before** you enter a curve. Braking in a curve is dangerous because it is easier to lock the wheels and cause a skid. Slow down as needed. Don't ever exceed the posted speed limit for the curve. Be in a gear that will let you accelerate slightly in the curve. This will help you keep control.

Speed and Distance Ahead

You should always be able to stop within the distance you can see ahead. Fog, rain or other conditions may require that you slow down to be able to stop in the distance you can see. At night, you can't see as far with low beams as you can with high beams. When you must use low beams, slow down.

Speed and Traffic Flow

When you're driving in heavy traffic, the safest speed is the speed of other vehicles. Vehicles going the same direction at the same speed are not likely to run into one another. Drive at the speed of the traffic, if you can without going at an illegal or unsafe speed. Keep a safe following distance.

The main reason drivers exceed speed limits is to save time. But anyone trying to drive faster than the speed of traffic will not be able to save much time. The risks involved are not worth it. If you go faster than the speed of other traffic:

- You'll have to keep passing other vehicles. This increases the chance of a crash.
- It is more tiring. Fatigue increases the chance of a crash.

Going with the flow of traffic is safer, and easier.

Speed on Downgrades

Going **slow** is the most important thing in going down long steep hills safely. If you do not go slowly enough, your brakes can become so hot they won't slow you down. Shift your transmission to a low gear **before** starting down the grade. Pay attention to signs warning of long downhill grades, and check your brakes before starting down the hill. Use a light, steady pressure on the brake pedal.

Going down steep hills safely is discussed more in "Mountain Driving." Read that section carefully.

Test Your Knowledge

1. How far ahead does the manual say you should look?
2. What are two main things to look for ahead?
3. What's your most important way to see to the sides and rear?
4. What does "communicating" mean in safe driving?
5. Where should your reflectors be placed when stopped on a divided highway?
6. What three things add up to total stopping distance?
7. If you go twice as fast, will your stopping distance increase by twice or by four times?
8. Empty trucks have the best braking. True or false?
9. What is hydroplaning?
10. What is "black ice?"

These questions may be on the test. If you can't answer all, reread Sections 2-4, 2-5, and 2-6.

To be a safe driver, you need space all around your vehicle. When things go wrong, space gives you time to think and to take action.

To have space available when something goes wrong, you need to **manage** space. While this is true for all drivers, it is very important for large vehicles. They take up more space and they require more space for stopping and turning.

Of all the space around your vehicle, it is the area ahead of the vehicle -- the space you're driving into -- that is most important.

The Need for Space Ahead. You need space ahead in case you must suddenly stop. According to accident reports, the vehicle that trucks and buses most often run into is the one in front of them. The most frequent cause is **following too closely**. Remember, if the vehicle ahead of you is smaller than yours, it can probably stop faster than you can. You may crash if you are following too closely.

How Much Space? How much space should you keep in front of you? One good rule says you need at least one second for each 10 feet of vehicle length at speeds below 40 mph. At greater speeds, you must add one second for safety. For example, if you are driving a 40-foot vehicle, you should leave 4 seconds between you and the vehicle ahead. In a 60-foot rig, you'll need 6 seconds. Over 40 mph, you'd need 5 seconds for a 40-foot vehicle and 7 seconds for a 60-foot vehicle.

To know how much space you have, wait until the vehicle ahead passes a shadow on the road, a pavement marking, or some other clear landmark. Then count off the seconds like this: "one thousand-and-one, one thousand-and-two" and so on, until you reach the same spot. Compare your count with the rule of one second for every 10 feet of length. If you are driving a 40 foot truck and only counted up to 2 seconds, you're too close. Drop back a little and count again until you have 4 seconds of following distance (or 5 seconds, if you're going over 40 mph). After a little practice, you will know how far back you should be. Remember to add one second for speeds above 40 mph. Also remember that when the road is slippery, you need **much more space** to stop.

You can't stop others from following you too close. But there are things you can do to make it safer.

- Stay to the right.
- Deal with tailgaters safely.

Stay to the Right. Heavy vehicles are often tailgated when they can't keep up with the speed of traffic. This often happens when you're going uphill. If a heavy load is slowing you down, stay in the right lane if you can. Going uphill, you should not pass another slow vehicle unless you can get around quickly and safely.

Dealing with Tailgaters Safely. In a large vehicle, it's often hard to see whether a vehicle is close behind you. You may be tailgated:

- When you are traveling slowly. Drivers trapped behind slow vehicles often follow closely.
- In bad weather. Many car drivers follow large vehicles closely during bad weather, especially when it is hard to see the road ahead.

Space Ahead

Space Behind

If you find yourself being tailgated, here are some things you can do to reduce the chances of a crash:

- Avoid quick changes. If you have to slow down or turn, signal early and reduce speed very gradually.
- Increase your following distance. Opening up room in front of you will help you to avoid having to make sudden speed or direction changes. It also makes it easier for the tailgater to get around you.
- Don't speed up. It's safer to be tailgated at a low speed than a high speed.
- Avoid tricks. Don't turn on your tail lights or flash your brake lights. Follow the suggestions above.

• **Space to the Sides**

Commercial vehicles are often wide and take up most of a lane. Safe drivers will manage what little space they have. You can do this by keeping your vehicle centered in your lane, and avoid driving alongside others.

Staying Centered in a Lane. You need to keep your vehicle centered in the lane to keep safe clearance on either side. If your vehicle is wide, you have little room to spare.

Traveling Next to Others. There are two dangers in traveling alongside other vehicles:

- Another driver may change lanes suddenly and turn into you.
- You may be trapped when **you** need to change lanes.

Find an open spot where you aren't near other traffic. When traffic is heavy, it may be hard to find an open spot. If you must travel near other vehicles, try to keep as much space as possible between you and them. Also, drop back or pull forward so that you are sure the other driver can see you.

Strong Winds. Strong winds make it difficult to stay in your lane. The problem is usually worse for lighter vehicles. This problem can be especially bad coming out of tunnels. Don't drive alongside others if you can avoid it.

• **Space Overhead**

Hitting overhead objects is a danger. Make sure you always have overhead clearance.

- Don't assume that the heights posted at bridges and overpasses are correct. Repaving or packed snow may have reduced the clearances since the heights were posted.
- The weight of a cargo van changes its height. An empty van is higher than a loaded one. That you got under a bridge when you were loaded does not mean that you can do it when you are empty.
- If you doubt you have safe space to pass under an object, go slowly. If you aren't sure you can make it, take another route. Warnings are often posted on low bridges or underpasses, but sometimes they are not.
- Some roads can cause a vehicle to tilt. There can be a problem clearing objects along the edge of the road, such as signs or trees. Where this is a problem, drive a little closer to the center of the road.
- Before you back into an area, get out and check for overhanging objects, such as trees, branches or electric wires. It's easy to miss seeing them while you are backing. (Also check for other hazards at the same time.)

Many drivers forget about the space under their vehicles. That space can be very small when a vehicle is heavily loaded. Railroad tracks can stick up several inches. This is often a problem on dirt roads and in unpaved yards where the surface around the tracks can wear away. Don't take a chance on getting hung up halfway across. Drainage channels across roads can cause the end of some vehicles to drag. Cross such depressions carefully.

• **Space Below**

The space around a truck or bus is important in turns. Because of wide turning and offtracking, large vehicles can hit other vehicles or objects during turns.

• **Space for Turns**

Right Turns. Here are some rules to help prevent right-turn crashes:

- Turn slowly to give yourself and others more time to avoid problems.
- If you are driving a truck or bus that cannot make the right turn without swinging into another lane, turn wide as you **complete** the turn, as shown in Figure 2-11. Keep the rear of your vehicle close to the curb. This will stop other drivers from passing you on the right.
- Don't turn wide to the left as you start the turn, as shown in Figure 2-12. A following driver may think you are turning left and try to pass you on the right. You may crash into the other vehicle as you complete your turn.
- If you must cross into the oncoming lane to make a turn, watch out for vehicles coming toward you. Give them room to go by or to stop. However, don't back up for them, because you might hit someone behind you.

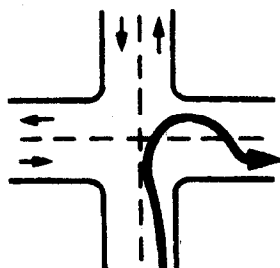


Figure 2-11
Do This.

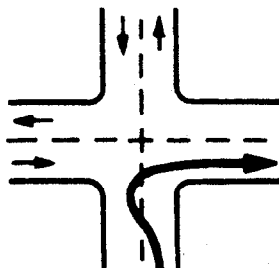


Figure 2-12.
Don't Do This!

Left Turns. On a left turn, make sure you have reached the center of the intersection before you start the left turn. If you turn too soon, the left side of your vehicle may hit another vehicle because of offtracking.

If there are two turning lanes, always take the righthand turn lane, as shown in Figure 2-13. Don't start in the inside lane because you may have to swing right to make the turn. Drivers on your right may be hard for you to see. You may crash into them.

***Space Needed
to Cross or Enter Traffic***

Be aware of the size and weight of your vehicle when you cross or enter traffic. Here are some important things to keep in mind:

- Because of slow acceleration and the space large vehicles require, you may need a much larger gap to enter traffic than you would in a car.
- Acceleration varies with the load. Allow more room if your vehicle is heavily loaded.
- Before you start across a road, make sure you can get all the way across before traffic reaches you.

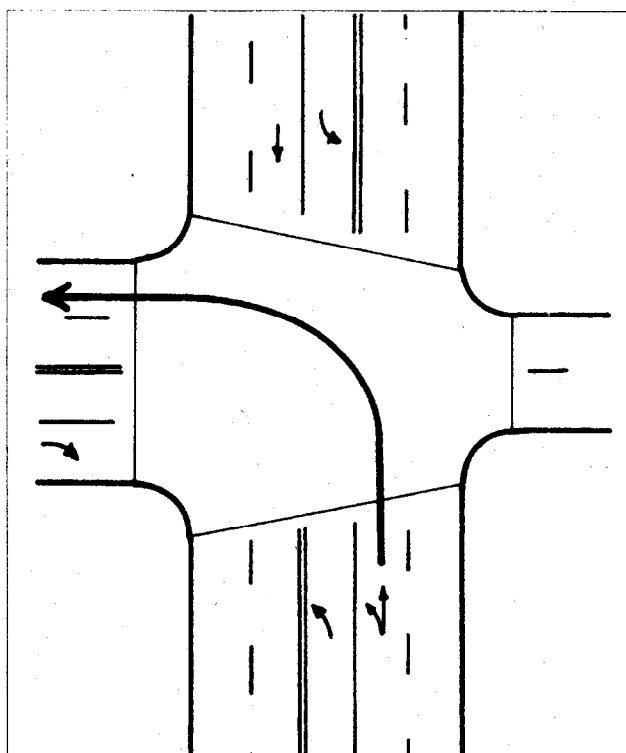


Figure 2-13

If there are two left turn lanes,
use the right hand lane.

Test Your Knowledge

1. How do you find out how many seconds of following distance space you have?
2. If you are driving a 30 foot vehicle at 55 m.p.h. how many seconds of following distance should you allow?
3. You should decrease your following distance if somebody is following you too closely. True or false?
4. If you swing wide to the left before turning right, another driver may try to pass you on the right. True or false?

These questions may be on the test. If you can't answer all, reread 2.7: Managing Space.

You are at greater risk when you drive at night. Drivers can't see hazards as soon as in daylight, so they have less time to respond. Drivers caught by surprise are less able to avoid a crash.

2.8 Driving at Night

It's More Dangerous

The problems of night driving involve the driver, the roadway, and the vehicle. We will discuss each of these factors.

Vision. People can't see as sharply at night or in dim light. Also, the eyes need time to adjust to seeing in dim light. Most people have noticed this when walking into a dark movie theater.

Glare. Drivers can be blinded for a short time by bright light. It takes time to recover from this blindness. Older drivers are especially bothered by glare. Most people have been temporarily blinded by camera flash units or by the high beams of an oncoming vehicle. It can take several seconds to recover from glare. Even two seconds of glare blindness can be dangerous. A vehicle going 55 mph will travel more than half the distance of a football field during that time. Don't look directly at bright lights when driving. Look at the right side of the road. Watch the sidelines when someone coming toward you has very bright lights.

Fatigue and Lack of Alertness. Fatigue (being tired) and lack of alertness are bigger problems at night. The body's need for sleep is beyond a person's control. Most people are less alert at night, especially after midnight. This is particularly true if you have been driving for a long time. Drivers may not see hazards as soon or react as quickly, so the chance of a crash is greater. If you are sleepy, the only safe cure is to get off the road and get some sleep. If you don't, you risk your life and the lives of others.

Poor Lighting. In the daytime there is usually enough light to see well. This is not true at night. Some areas may have bright street lights, but many areas will have poor lighting. On most roads you will probably have to depend entirely on your headlights.

Less light means you will not be able to see hazards as well as in daytime. Road users who do not have lights are hard to see. There are many accidents at night involving pedestrians, joggers, bicyclists, and animals.

Even when there are lights, the road scene can be confusing. Traffic signals and hazards can be hard to see against a background of signs, shop windows, and other lights.

Drive slower when lighting is poor or confusing. Drive slowly enough to be sure you can stop in the distance you can see ahead.

Drunk Drivers. Drunk drivers and drivers under the influence of drugs are a hazard to themselves and to you. Be especially alert around the closing times for bars and taverns. Watch for drivers who have trouble staying in their lane or maintaining speed, stop without reason, or show other signs of being under the influence of alcohol or drugs.

Headlights. At night your headlights will usually be the main source of light for you to see and for others to see you. You can't see nearly as much with your headlights as you can see in the daytime. With low beams you can see ahead about 250 feet and with high beams

Driver Factors

Roadway Factors

Vehicle Factors

about 350-500 feet. You must adjust your speed to keep your stopping distance within your sight distance. This means going slow enough to be able to stop within the range of your headlights. Otherwise, by the time you see a hazard, you will not have time to stop.

Night driving can be more dangerous if you have problems with your headlights. Dirty headlights may give only half the light they should. This cuts down your ability to see, and makes it harder for others to see you. Make sure your lights are clean and working. Headlights can be out of adjustment. If they don't point in the right direction, they don't give you a good view and they can blind other drivers. Have a qualified person make sure they are adjusted properly.

Other Lights. In order for you to be seen easily, the following must be clean and working properly:

- Reflectors.
- Marker lights.
- Clearance lights.
- Tail lights.
- Identification lights.

Turn Signals and Brake Lights. At night your turn signals and brake lights are even more important for telling other drivers what you intend to do. Make sure you have clean, working turn signals and stop lights.

Windshields and Mirrors. It is more important at night than in the daytime to have clean windshields and mirrors. Bright lights at night can cause dirt on your windshield or mirrors to create a glare of its own, blocking your view. Most people have experienced driving toward the sun just as it has risen or is about to set and found that they can barely see through a windshield that seemed to look o.k. in the middle of the day. Clean your windshield on the inside and outside for safe driving at night.

Night Driving Procedures

Pre-Trip Procedures. Make sure you are rested and alert. If you are drowsy, **sleep** before you drive! Even a nap can save your life or the lives of others. If you wear eyeglasses, make sure they are clean and unscratched. Don't wear sun glasses at night. Do a complete pre-trip inspection of your vehicle. Pay attention to checking all lights and reflectors and cleaning those you can reach.

Avoid blinding others. Glare from your headlights can cause problems for drivers coming towards you. They can also bother drivers going in the same direction you are, when your lights shine in their rearview mirrors. Dim your lights before they cause glare for other drivers. Dim your lights within 500 feet of an oncoming vehicle and when following another vehicle within 500 feet.

Avoid glare from oncoming vehicles. Do not look directly at lights of oncoming vehicles. Look slightly to the right at a right lane or edge marking if available. If other drivers don't put their low beams on, don't try to "get back at them" by putting your own high beams on. This increases glare for oncoming drivers and increases the chance of a crash.

Use high beams when you can. Some drivers make the mistake of always using low beams. This seriously cuts down on their ability to see ahead. Use high beams when it is safe and legal to do so. Use them when you are not within 500 feet of an approaching vehicle. Also, don't let the inside of your cab get too bright. This makes it harder to see outside. Keep the interior light off and adjust your instrument lights as low as you can and still read the gauges.

If you get sleepy, stop driving at the nearest safe place. People often don't realize how close they are to falling asleep even when their eyelids are falling shut. If you can safely do so, look at yourself in a mirror. If you look sleepy, or you just feel sleepy, **stop driving!** You are in a very dangerous condition. The only safe cure is to sleep.

Make sure your vehicle is ready before driving in winter weather. You should make a regular pre-trip inspection, paying extra attention to the following items.

2.9 Driving in Winter Vehicle Checks

Coolant Level and Antifreeze Amount. Make sure the cooling system is full and there is enough anti-freeze in the system to protect against freezing. This can be checked with a special coolant tester.

Defrosting and Heating Equipment. Make sure the defrosters work. They are needed for safe driving. Make sure the heater is working and that you know how to operate it. If you use other heaters and expect to need them (e.g., mirror heaters, battery box heaters, fuel tank heaters), check their operation.

Wipers and Washers. Make sure the windshield wiper blades are in good condition. Make sure the wiper blades press against the window hard enough to wipe the windshield clean. Otherwise they may not sweep off snow properly. Make sure the windshield washer works and there is washing fluid contained in the washer reservoir. Use windshield washer antifreeze to prevent freezing of the washer liquid. If you can't see well enough while driving (for example, if your wipers fail), stop safely and fix the problem.

Tires. Make sure you have enough tread on your tires. The drive tires must provide traction to push the rig over wet pavement and through snow. The steering tires must have traction to steer the vehicle. Enough tread is especially important in winter conditions. You should have at least 4/32 inch tread depth in every major groove on front wheels and at least 2/32 inch on other wheels. More would be better. Use a gauge to determine if you have enough tread for safe driving.

Tire Chains. You may find yourself in conditions where you can't drive without chains, even to get to a place of safety. Carry the right number of chains and extra cross links. Make sure they will fit your drive tires. Check the chains for broken hooks, worn or broken cross links, and bent or broken side chains. Learn how to put the chains on before you need to do it in snow and ice.

Lights and Reflectors. Make sure the lights and reflectors are clean. Lights and reflectors are especially important during bad weather. Check from time to time during bad weather to make sure they are clean and working right.

Windows and Mirrors. Remove any ice, snow, etc., from the windshield, windows, and mirrors before starting. Use a windshield scraper, snow brush, and windshield defroster as necessary.

Hand Holds, Steps, and Deck Plates. Remove all ice and snow from hand holds, steps, and deck plates which you must use to enter the cab or to move about the vehicle. This will reduce the danger of slipping.

Radiator Shutters and Winterfront. Remove ice from the radiator shutters. Make sure the winterfront is not closed too tightly. If the shutters freeze shut or the winterfront is closed too much, the engine may overheat and stop.

Exhaust System. Exhaust system leaks are especially dangerous when cab ventilation may be poor (windows rolled up, etc.). Loose connections could permit poisonous carbon monoxide to leak into your vehicle. Carbon monoxide gas will cause you to be sleepy. In large enough amounts it can kill you. Check the exhaust system for loose parts and for sounds and signs of leaks.

Slippery Surfaces. Drive slowly and smoothly on slippery roads. If it is very slippery you shouldn't drive at all. Stop at the first safe place.

The following are some safety guidelines.

Start gently and slowly. When first starting, get the feel of the road. Don't hurry.

Adjust turning and braking to conditions. Make turns as gentle as possible. Don't brake any harder than necessary, and don't use the engine brake or speed retarder. (They can cause the driving wheels to skid on slippery surfaces.)

Adjust speed to conditions. Don't pass slower vehicles unless necessary. Go slow and watch far enough ahead to keep a steady speed. Avoid having to slow down and speed up. Take curves at slower speeds and don't brake while in curves. Be aware that as the temperature rises to the point where ice begins to melt, the road becomes even more slippery. Slow down more.

Adjust space to conditions. Don't drive alongside other vehicles. Keep a longer following distance. When you see a traffic jam ahead, slow down or stop to wait for it to clear. Try hard to anticipate stops early and slow down gradually.

Wet Brakes. When driving in heavy rain or deep standing water, your brakes will get wet. Water in the brakes can cause the brakes to be weak, to apply unevenly, or to grab. This can cause lack of braking power, wheel lockups, pulling to one side or the other, and jackknife if you pull a trailer.

Driving

Avoid driving through deep puddles or flowing water if possible. If not, you should:

- Slow down.
- Place transmission in a low gear.
- Gently put on the brakes. This presses linings against brake drums or discs and keeps mud, silt, sand, and water from getting in.
- Increase engine RPM and cross the water while keeping light pressure on the brakes.
- When out of the water, maintain light pressure on the brakes for a short distance to heat them up and dry them out.
- Make a test stop when safe to do so. Check behind to make sure no one is following, then apply the brakes to be sure they work right. If not, dry out further as described above. (CAUTION: Do not apply too much brake pressure and accelerator at the same time or you can overheat brake drums and linings.)

Do a normal pre-trip inspection but pay special attention to the following items.

2.10 Driving in Very Hot Weather

Vehicle Checks

Tires. Check the tire mounting and air pressure. Inspect the tires every two hours or every 100 miles when driving in very hot weather. Air pressure increases with temperature. Do not let air out or the pressure will be too low when the tires cool off. If a tire is too hot to touch, remain stopped until the tire cools off. Otherwise the tire may blow out or catch fire. Pay special attention to recapped or retreaded tires. Under high temperatures the tread may separate from the body of the tire.

Engine Oil. The engine oil helps keep the engine cool, as well as lubricating it. Make sure there is enough engine oil. If you have an oil temperature gauge, make sure the temperature is within the proper range while you are driving.

Engine Coolant. Before starting out, make sure the engine cooling system has enough water and antifreeze according to the engine manufacturer's directions. (Antifreeze helps the engine under hot conditions as well as cold conditions.) When driving, check the water temperature or coolant temperature gauge from time to time. Make sure that it remains in the normal range. If the gauge goes above the highest safe temperature, there may be something wrong that could lead to engine failure and possibly fire. Stop driving as soon as safely possible and try to find out what is wrong.

Some vehicles have sight glasses or see-through coolant overflow containers or coolant recovery containers. These permit you to check the coolant level while the engine is hot. If the container is not part of the pressurized system, the cap can be safely removed and coolant added even when the engine is at operating temperature. **Never remove the radiator cap or any part of the pressurized system until the system has cooled.** Steam and boiling water can spray under pressure and cause severe burns. If you can touch the radiator cap with your bare hand, it is probably cool enough to open.

If coolant has to be added to a system without a recovery tank or overflow tank, follow these steps.

- Shut engine off.
- Wait until engine has cooled.
- Protect hands (use gloves or a thick cloth).
- Turn radiator cap slowly to the first stop, which releases the pressure seal.
- Step back while pressure is released from cooling system.
- When all pressure has been released, press down on the cap and turn it further to remove it.
- Visually check level of coolant and add more coolant if necessary.
- Replace cap and turn all the way to the closed position.

Engine Belts. Learn how to check V-belt tightness on your vehicle by pressing on the belts. Loose belts will not turn the water pump and/or fan properly. This will result in overheating. Also check belts for cracking, or other signs of wear.

Hoses. Make sure coolant hoses are in good condition. A broken hose while driving can lead to engine failure and even fire.

Watch for Bleeding Tar. Tar in the road pavement frequently rises to the surface in very hot weather. Spots where tar "bleeds" to the surface are very slippery.

Go Slow Enough to Prevent Overheating. High speeds create more heat for tires and the engine. In desert conditions the heat may build up to the point where it is dangerous. The heat will increase chances of tire failure, or even fire, and engine failure.

Driving

Test Your Knowledge

1. You should use low beams whenever you can. True or false?
2. What should you do before you drive if you are drowsy?
3. What effects can wet brakes cause? How can you avoid these problems?
4. You should let air out of hot tires so the pressure goes back to normal. True or false?
5. You can safely remove the radiator cap as long as the engine isn't overheated. True or false?

These questions may be on the test. If you can't answer all, reread 2.8, 2.9, and 2.10.

In mountain driving, the force of gravity plays a major role. If you have a heavy load, you will have to use lower gears and go slower to climb hills. In coming down steep hills, gravity will tend to speed you up. You must go slow enough that your brakes can hold you back without getting too hot. If the brakes become too hot, they may start to "fade." This means that you have to apply them harder and harder to get the same stopping power. If the brakes continue to be used hard, they can continue to fade until you can't slow down or stop at all. These dangers can be avoided by going slow when going down hill.

No matter what the size of your vehicle, going down long, steep grades can cause your brakes to fail if you go too fast. Using lower gears will help you keep from going too fast. Lower gears allow engine compression and friction to help slow the vehicle. This is true whether you have an automatic transmission or a manual transmission.

If you do have a large vehicle with a manual transmission, don't wait until you have started down the hill to shift down. You might get hung up in neutral and would lose the benefit of engine braking. You would find yourself coasting, which would be illegal and dangerous. **Be in the right gear before starting down the hill.**

With older trucks, a rule for choosing gears was to use the same gear going down a hill that you would need to climb the hill. However, new trucks have low friction parts and streamlined shapes for fuel economy. They may also have more powerful engines. This means they can go up hills in higher gears and have less friction and air drag to hold them back going down hills. For that reason, drivers of modern trucks may have to use **lower gears going down** a hill than would be required to go up the hill. Find out what is right for your vehicle.

When going down hill, brakes will always heat up. They are designed so brake shoes or pads rub against the brake drum or disks to slow the vehicle, which creates heat. Brakes are designed to take a lot of heat. However, brakes can be made to fail from excessive heat by attempting to slow down from too high a speed too many times or too quickly. Brakes will fade (have less stopping power) when they get very hot, and they can get to the point where they will no longer slow the vehicle.

The right way to use your brakes for long downhill grades is to go slow enough that a fairly light use of the brakes will keep your speed from increasing. If you go slow enough, the brakes will be able to get rid of the heat and they won't get too hot.

Some people believe that letting up on the brakes from time to time will allow them to cool enough so they don't become overheated. Tests have proven this is **not** true. Brake drums cool very slowly, so the amount of cooling between applications is not enough to prevent overheating. This type of braking requires heavier brake pressures than steady application does. Heavy pressure on the brakes from time to time builds up more heat than light continuous pressure does. Therefore, select the right gear, go slow enough, and maintain a lighter, steadier use of the brakes.

2.11 Mountain Driving

Use of Gears Going Down Hill

Proper Braking

Escape ramps have been built on many steep mountain grades. Escape ramps are made to stop runaway vehicles safely without injuring drivers and passengers. Escape ramps use a long bed of loose soft material (pea gravel) to slow a runaway vehicle, sometimes in combination with an upgrade.

Know escape ramp locations on your route. Signs show drivers where ramps are located. Escape ramps save lives, equipment, and cargo. Use them if you lose your brakes.

2.12 Seeing Hazards

Importance of Seeing Hazards

What is a Hazard? A hazard is any road condition or other road user (driver, bicyclist, pedestrian) that is a possible danger. For example, a car in front of you is headed towards the freeway exit, but his brake lights come on and he begins braking hard. This could mean that the driver is uncertain about taking the offramp. He might suddenly return to the highway. This car is a **hazard**. If the driver of the car cuts in front of you, it is no longer just a hazard; it is an emergency.

Seeing Hazards Lets You Be Prepared. You will have more time to act if you see hazards before they become emergencies. In the example above, you might make a lane change or slow down to prevent a crash if the car suddenly cuts in front of you. Seeing this hazard gives you time to check your mirrors and signal a lane change. Being prepared reduces the danger. A driver who did not see the hazard until the slow car pulled back on the highway in front of him would have to do something very suddenly. Sudden braking or a quick lane change is much more likely to lead to a crash.

Learning to See Hazards. There are often clues that will help you see hazards. The more you drive, the better you can get at seeing hazards. This section will talk about hazards that you should be aware of.

Hazardous Roads

Slow down and be very careful if you see any of the following road hazards.

Work Zones. When people are working on the road it is a hazard. There may be narrower lanes, sharp turns, or uneven surfaces. Other drivers are often distracted and drive unsafely. Workers and construction vehicles may get in the way. Drive slowly and carefully near work zones. Use your 4-way flashers or brake lights to warn drivers behind you.

Drop Off. Sometimes the pavement drops off sharply near the edge of the road. Driving too near the edge can tilt your vehicle toward the side of the road. This can cause the top of your vehicle to hit roadside objects (signs, tree limbs). Also, it can be hard to steer as you cross the drop off, going off the road or coming back on.

Foreign Objects. Things that have fallen on the road can be hazards. They can be a danger to your tires and wheel rims. They can damage electrical and brake lines. They can be caught between dual tires and cause severe damage. Some obstacles which appear to be harmless can be very dangerous. For example, cardboard

boxes may be empty, but they may also contain some solid or heavy material capable of causing damage. The same is true of paper and cloth sacks. It is important to remain alert for objects of all sorts, so you can see them early enough to avoid them without making sudden, unsafe moves.

Offramps/Onramps. Freeway and turnpike exits can be particularly dangerous for commercial vehicles. Offramps and onramps often have speed limit signs posted. Remember, these speeds may be safe for automobiles, **but may not be safe for larger vehicles or heavily loaded vehicles.** Exits which go downhill and turn at the same time can be especially dangerous. The downgrade makes it difficult to reduce speed. Braking and turning at the same time can be a dangerous practice. Make sure you are going slow enough before you get on the curved part of an offramp or onramp.

In order to protect yourself and others, you must know when other drivers may do something hazardous. Some clues to this type of hazard are discussed below:

Drivers Who Are Hazards

Blocked Vision. People who can't see others are a very dangerous hazard. Be alert for drivers whose vision is blocked. Vans, loaded station wagons, and cars with the rear window blocked are examples. Rental trucks should be watched carefully. Their drivers are often not used to the limited vision they have to the sides and rear of the truck. In winter, vehicles with frosted, ice covered, or snow covered windows are hazards.

Vehicles may be partly hidden by blind intersections or alleys. If you only can see the rear or front end of a vehicle but not the driver, then he or she can't see you. Be alert because he / she may back out or enter into your lane. Always be prepared to stop.

Delivery trucks can present a hazard. The driver's vision is often blocked by packages, or vehicle doors. Drivers of step vans, postal vehicles, and local delivery vehicles often are in a hurry and may suddenly step out of their vehicle or drive their vehicle into the traffic lane.

Parked vehicles can be hazards, when the people start to get out. Or, they may suddenly start up and drive into your way. Watch for movement inside the vehicle or movement of the vehicle itself that shows people are inside. Watch for brake lights or backup lights, exhaust, and other clues that a driver is about to move.

Be careful of a stopped bus. Passengers may cross in front of or behind the bus, and they often can't see you.

Pedestrians and bicyclists can also be hazards. Walkers, joggers and bicyclists may be on the road with their back to the traffic, so they can't see you. Sometimes, they wear portable stereos with head sets, so they can't hear you either. This can be dangerous. On rainy days, pedestrians may not see you because of hats or umbrellas. They may be hurrying to get out of the rain and may not pay attention to the traffic.

Distractions. People who are distracted are hazards. Watch for where they are looking. If they are looking elsewhere, they can't see you. But be alert even when they are looking at you. They may believe that they have the right of way.

Children. Children tend to act quickly without checking traffic. Children playing with one another may not look for traffic and are a serious hazard.

Talkers. Drivers or pedestrians talking to one another may not be paying close attention to the traffic.

Workers. People working on or near the roadway are a hazard clue. The work creates a distraction for other drivers and the workers themselves may not see you.

Ice cream truck. Someone selling ice cream is a hazard clue. Children may be nearby and may not see you.

Disabled vehicle. Drivers changing a tire or fixing an engine often do not pay attention to the danger that roadway traffic is to them. They are often careless. Jacked up wheels or raised hoods are hazard clues.

Accidents. Accidents are particularly hazardous. People involved in the accident may not look for traffic. Passing drivers tend to look at the accident. People often run across the road without looking. Vehicles may slow or stop suddenly.

Shoppers. People in and around shopping areas are often not watching traffic because they are looking for stores or looking into store windows.

Confused Drivers. Confused drivers often change direction suddenly or stop without warning. Confusion is common near freeway or turnpike interchanges and major intersections. Tourists unfamiliar with the area can be very hazardous. Clues to tourists include car-top luggage and out-of-state license plates. Unexpected actions (stopping in the middle of a block, changing lanes for no apparent reason, backup lights suddenly going on) are clues to confusion. Hesitation is another clue, including driving very slowly, using brakes often, or stopping in the middle of an intersection. You may also see drivers who are looking at street signs, maps, and house numbers. These drivers may not be paying attention to you.

Slow Drivers. Motorists who fail to maintain normal speed are hazards. Seeing slow moving vehicles early can prevent a crash. Some vehicles by their nature are slow and seeing them is a hazard clue (mopeds, farm machinery, construction machinery, tractors, etc.). Some of these will have the "slow moving vehicle" symbol to warn you. This is a red triangle with an orange center. Watch for it.

Drivers signaling a turn may be a hazard. Drivers signaling a turn may slow more than expected or stop. If they are making a tight turn into an alley or driveway they may go very slow. If they are blocked by pedestrians or other vehicles they may have to stop on the roadway. Vehicles turning left may have to stop for oncoming vehicles.

Drivers in a Hurry. Drivers may feel your commercial vehicle is preventing them from getting where they want to go on time. Such drivers may pass you without a safe gap in the oncoming traffic, cutting too close in front of you. Drivers entering the road may pull in front of you in order to avoid being stuck behind you, causing you to brake. Be aware of this and watch for drivers who are in a hurry.

Impaired Drivers. Drivers who are sleepy, have had too much to drink, on drugs, or who are ill are hazards. Some clues to these drivers are:

- Weaving across the road or drifting from one side to another.
- Leaving the road (dropping right wheels onto the shoulder, or bumping across a curb in a turn).
- Stopping at the wrong time (stopping at a green light, or waiting for too long at a stop).
- Open window in cold weather.
- Speeds up or slows down suddenly, driving too fast or too slow.

Be alert for drunk drivers and sleepy drivers late at night.

Driver Body Movement As A Clue. Drivers look in the direction they are going to turn. You may sometimes get a clue from a driver's head and body movements that a driver may be going to make a turn even though the turn signals aren't on. Drivers making over-the-shoulder checks may be going to change lanes. These clues are most easily seen in motorcyclists and bicyclists. Watch other road users and try to tell whether they might do something hazardous.

Conflicts. You are in conflict when you have to change speed and/or direction to avoid hitting someone. Conflicts occur at intersections where vehicles meet, at merges (such as turnpike onramps) and where there are needed lane changes (such as the end of a lane, forcing a move to another lane of traffic). Other situations include slow moving or stalled traffic in a traffic lane, and accident scenes. Watch for other drivers who are in conflict because they are a hazard to you. When they react to this conflict, they may do something that will put them in conflict with you.

You should always be looking for hazards. Continue to learn to see hazards on the road. However, don't forget why you are looking for the hazards: they may turn into **emergencies**. You look for the hazards in order to have time to **plan a way out of any emergency**. When you see a hazard, think about the emergencies that could develop and figure out what you would do. Always be prepared to take action based on your plans. In this way, you will be a prepared, defensive driver who will improve not only your own safety but the safety of all road users.

Always Have a Plan

Test Your Knowledge

1. Why should you be in the right gear **before** starting down a hill?
2. Why do new trucks use lower gears going down a hill than coming up?
3. The key to preventing brake fade is to go slow enough. True or false?
4. What is a hazard?
5. Why make emergency plans when you see a hazard?

These questions may be on the test. If you can't answer all, reread Sections 2.11 and 2.12.

2.13 Emergencies

• **Steering to Avoid a Crash**

Traffic emergencies occur when two vehicles are about to collide. **Vehicle** emergencies occur when tires, brakes or other critical parts fail. Following the safety practices in this manual can help prevent emergencies. But if an emergency does happen, your chances of avoiding a crash depend upon how well you take action. Actions you can take are discussed below.

Stopping is not always the safest thing to do in an emergency. When you don't have enough room to stop, you may have to steer away from what's ahead. Remember, you can almost always turn to miss an obstacle more quickly than you can stop. (However, top-heavy vehicles and tractors with multiple trailers may flip over.)

Keep Both Hands on the Steering Wheel. In order to turn quickly, you must have a firm grip on the steering wheel with both hands. The best way to have both hands on the wheel if there is an emergency is to keep them there all the time.

How to Turn Quickly and Safely. A quick turn can be made safely, if it's done the right way. Here are some points that safe drivers use:

- Do **not** apply the brake while you are turning. It's very easy to lock your wheels while turning. If that happens, you may skid out of control.
- Do **not** turn any more than needed to clear whatever is in your way. The more sharply you turn, the greater the chances of a skid or rollover.
- Be prepared to "countersteer," that is, to turn the wheel back in the other direction, once you've passed whatever was in your path. Unless you are prepared to countersteer, you won't be able to do it quickly enough. You should think of emergency steering and countersteering as two parts of one driving action.

Where to Steer. If an oncoming driver has drifted into your lane, a move to your right is best. If that driver realizes what has happened, the natural response will be to return to his or her own lane.

If something is blocking your path, the best direction to steer will depend on the situation.

- If you have been using your mirrors, you'll know which lane is empty and can be safely used.
- If the shoulder is clear, going right may be best. No one is likely to be driving on the shoulder but someone may be passing you on the left. You will know if you have been using your mirrors.
- If you are blocked on both sides, a move to the right may be best. At least you won't force anyone into an opposing traffic lane and a possible head-on collision.

Leaving the Road. In some emergencies, you may have to drive off the road. It may be less risky than facing a collision with another vehicle.

Most shoulders are strong enough to support the weight of a large vehicle and, therefore, offer an available escape route. Here are some guidelines, if you do leave the road.

Avoid Braking. If possible, avoid using the brakes until your speed has dropped to about 20 mph. Then brake very gently to avoid skidding on a loose surface.

Keep one set of wheels on pavement if possible. This helps to maintain control.

Stay on the Shoulder. If the shoulder is clear, stay on it until your vehicle has come to a stop. Signal and check your mirrors before pulling back onto the road.

Returning to the Road. If you are forced to return to the road before you can stop, use the following procedure:

- Hold the wheel tightly and turn sharply enough to get right back on the road safely. Don't try to edge gradually back on the road. If you do, your tires might grab unexpectedly and you could lose control.
- When both front tires are on the paved surface, **countersteer** immediately. The two turns should be made as a single "steer-countersteer" move.

If somebody suddenly pulls out in front of you, your natural response is to hit the brakes. This is a good response if there's enough distance to stop and you use the brakes correctly.

You should brake in a way that will keep your vehicle in a straight line and allow you to turn if it becomes necessary. You can use the "controlled braking" method or the "stab braking" method.

Controlled braking. With this method, you apply the brakes as hard as you can **without** locking the wheels. Keep steering wheel movements very small while doing this. If you need to make a larger steering adjustment or if the wheels lock, release the brakes. Reapply the brakes as soon as you can.

Stab braking.

- Apply your brakes all the way.
- Release brakes when wheels lock up.
- As soon as the wheels start rolling, apply the brakes fully again. (It can take up to one second for the wheels to start rolling after you release the brakes. If you reapply the brakes before the wheels start rolling, the vehicle won't straighten out.)

Don't Jam on the Brakes. Emergency braking does not mean pushing down on the brake pedal as hard as you can. That will only keep the wheels locked up and cause a skid. If the wheels are skidding, you cannot control the vehicle.

Brakes kept in good condition rarely fail. Most **hydraulic** brake failures occur for one of two reasons: (Air brakes are discussed in Section 5.)

- Loss of hydraulic pressure.
- Brake fade on long hills.

Loss of Hydraulic Pressure. When the system won't build up pressure, the brake pedal will feel spongy or go to the floor. Here are some things you can do:

• ***How to Stop Quickly and Safely***

• ***Brake Failure***

Downshift. Putting the vehicle into a lower gear will help to slow the vehicle.

Pump the brakes. Sometimes pumping the brake pedal will generate enough hydraulic pressure to stop the vehicle.

Use the parking brake. The parking or emergency brake is separate from the hydraulic brake system. Therefore, it can be used to slow the vehicle. However, be sure to press the release button or pull the release lever at the same time you use the emergency brake so you can adjust the brake pressure and keep the wheels from locking up.

Find an escape route. While slowing the vehicle, look for an escape route—an open field, side street or escape ramp. Turning uphill is a good way to slow and stop the vehicle. Make sure the vehicle does not start rolling backward after you stop. Put it in low gear, apply the parking brake, and if necessary roll back into some obstacle that will stop the vehicle.

Brake Failure on Downgrades. Going slow enough and braking properly will almost always prevent brake failure on long downgrades. Once the brakes have failed, however, you are going to have to look outside your vehicle for something to stop it.

Your best hope is an **escape ramp**. If there is one, there'll be signs telling you about it. Use it. Ramps are usually located a few miles from the top of the downgrade. Every year, hundreds of drivers avoid injury to themselves or damage to their vehicles by using escape ramps. Some escape ramps use soft gravel that resists the motion of the vehicle and brings it to a stop. Others turn uphill, using the hill to stop the vehicle and soft gravel to hold it in place.

Any driver who loses brakes going downhill should use an escape ramp if it's available. If you don't use it, your chances of having a serious crash may be much worse.

If no escape ramp is available, take the least hazardous escape route you can — such as an open field, or a side road that flattens out or turns uphill. Make the move as soon as you know your brakes don't work. The longer you wait, the faster the vehicle will go and the harder it will be to stop.

• **Tire Failure**

There are four important things that safe drivers do to handle a tire failure safely:

- Be aware that a tire has failed.
- Hold the steering wheel firmly.
- Stay off the brake.
- After stopping, check all the tires.

Recognize Tire Failure. Quickly knowing you have a tire failure will let you have more time to react. Having just a few seconds to remember what it is you're supposed to do can help you. The major signs of tire failure are:

Sound. The loud "bang" of a blowout is an easily recognized sign. Because it can take a few seconds for your vehicle to react, you might think it was some other vehicle. But any time you hear a tire blow, you'd be safest to assume it was yours.

Vibration. If the vehicle thumps or vibrates heavily, it may be a sign that one of the tires has gone flat. With a rear tire, that may be the only sign you get.

Feel. If the steering feels "heavy," it is probably a sign that one of the front tires has failed. Sometimes, failure of a rear tire will cause the vehicle to slide back and forth or "fishtail." However, dual rear tires usually prevent this.

Any of these signs is a warning of possible tire failure. You should do the following things.

Hold the Steering Wheel Firmly. If a front tire fails, it can twist the steering wheel out of your hand. The only way to prevent this is to keep a firm grip on the steering wheel with both hands at all times.

Stay Off the Brake. It's natural to want to brake in an emergency. However, braking when a tire has failed could cause loss of control. Unless you're about to run into something, stay off the brake until the vehicle has slowed down. Then brake very gently, pull off the road, and stop.

Check the Tires. After you've come to a stop, get out and check all the tires. Do this even if the vehicle seems to be handling all right. If one of your dual tires goes, the only way you may know it is by getting out and looking at it.

A skid happens whenever the tires lose their grip on the road. This is caused in one of four ways:

2.14 Skid Control and Recovery

Overbraking. Braking too hard and locking up the wheels. Skids also can occur when using the speed retarder when the road is slippery.

Oversteering. Turning the wheels more sharply than the vehicle can turn.

Overacceleration. Supplying too much power to the drive wheels, causing them to spin.

Driving too fast. Most serious skids result from driving too fast for road conditions. Drivers who adjust their driving to conditions don't overaccelerate and don't have to overbrake or oversteer from too much speed.

By far the most common skid is one in which the rear wheels lose traction through excessive braking or acceleration. Skids caused by acceleration usually happen on ice or snow. They can be easily stopped by taking your foot off the accelerator. (If it is very slippery, push the clutch in. Otherwise the engine can keep the wheels from rolling freely and regaining traction.)

• Drive-Wheel Skids

Rear wheel braking skids occur when the rear drive wheels lock. Because locked wheels have less traction than rolling wheels, the rear wheels usually slide sideways in an attempt to "catch up" with

the front wheels. In a bus or straight truck, the vehicle will slide sideways in a "spin out." With vehicles towing trailers, a drive-wheel skid can let the trailer push the towing vehicle sideways, causing a sudden jackknife. (Figure 2-14)

- **Correcting a Drive-Wheel Braking Skid**

Do the following to correct a drive-wheel braking skid.

Stop braking. This will let the rear wheels roll again, and keep the rear wheels from sliding any further. If on ice, push in the clutch to let the wheels turn freely.

Turn quickly. When a vehicle begins to slide sideways, **quickly** steer in the direction you want the vehicle to go—down the road. You must turn the wheel quickly.

Countersteer. As a vehicle turns back on course, it has a tendency to keep right on turning. Unless you turn the steering wheel quickly the other way, you may find yourself skidding in the opposite direction.

Learning to stay off the brake, turn the steering wheel quickly, push in the clutch, and counter-steer in a skid takes a lot of practice. The best place to get this practice is on a large driving range or "skid pad."

- **Front-Wheel Skids**

Most front-wheel skids are caused by driving too fast for conditions. Other causes are: lack of tread on the front tires, and cargo loaded so not enough weight is on the front axle. In a front-wheel skid, the front end tends to go in a straight line regardless of how much you turn the steering wheel. On a very slippery surface, you may not be able to steer around a curve or turn.

When a front-wheel skid occurs, the only way to stop the skid is to let the vehicle slow down. Stop turning and/or braking so hard. Slow down as quickly as possible without skidding.

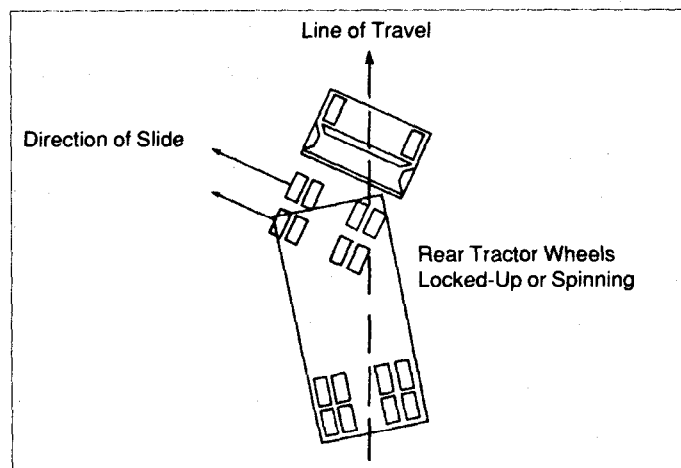


Figure 2-14
Tractor Jackknife

Test Your Knowledge

1. Stopping is not always the safest thing to do in an emergency. True or false?
2. What are some advantages of going right instead of left around an obstacle?
3. What is an "escape ramp?"
4. If a tire blows out, you should put the brakes on hard to stop quickly. True or false?

These questions may be on the test. If you can't answer all, reread Sections 2.13 and 2.14.

When you're in an accident and not seriously hurt you need to act to prevent further damage or injury. The basic steps to be taken at any accident are to:

- Protect the area.
- Notify authorities.
- Care for injured.

The first thing to do at an accident scene is to keep another accident from happening at the same spot. To protect the accident area:

- If your vehicle is involved in the accident, try to get it to the side of the road. This will help prevent another accident and allow traffic to move.
- If you're stopping to help, park away from the accident. The area immediately around the accident will be needed for emergency vehicles.
- Put on your flashers.
- Set out reflective triangles to warn other traffic. Make sure they can be seen by other drivers in time for them to avoid the accident.

If you have a CB, put out a call over the emergency channel before you get out of your vehicle. If not, wait until after the accident scene has been properly protected, then phone or send someone to phone the police. Try to determine where you are so you can give the exact location.

If a qualified person is at the accident and helping the injured, stay out of the way unless asked to assist. Otherwise, do the best you can to help any injured parties. Here are some simple steps to follow in giving assistance:

- Don't move a severely injured person unless the danger of fire or passing traffic makes it necessary.
- Stop heavy bleeding by applying direct pressure to the wound.
- Keep the injured person warm.

2.15 Accident Procedures

• *Protect the Area*

• *Notify Authorities*

• *Care for Injured*

Truck fires can cause damage and injury. Learn the causes of fires and how to prevent them. Know what to do to extinguish fires.

The following are some causes of vehicle fires:

After accidents. Spilled fuel, improper use of flares.

Tires. Underinflated tires and duals that touch.

Electrical system. Short circuits due to damaged insulation, loose connections.

Fuel. Driver smoking, improper fueling, loose fuel connections.

Cargo. Flammable cargo, improperly sealed or loaded, poor ventilation.

2.16 Fires

• *Causes of Fire*

Fire Prevention

Pay attention to the following:

Pretrip inspection. Make a complete inspection of the electrical, fuel, and exhaust systems, tires, and cargo.

Enroute inspection. Check the tires, wheels, and truck body for signs of heat whenever you stop during a trip.

Follow safe procedures. Follow correct safety procedures for fueling the vehicle, using brakes, handling flares, and other activities that can cause a fire.

Monitoring. Check the instruments and gauges often for signs of overheating, and use the mirrors to look for signs of smoke from tires, or the vehicle.

Caution. Use normal caution in handling anything flammable.

Fire Fighting

Knowing how to fight fires is important. Fires have been made worse by drivers who didn't know what to do. Here are some procedures to follow in case of fire:

Pull off the road. The first step is to get the vehicle off the road and stop. In doing so:

- Park in an open area, away from buildings, trees, brush, other vehicles or anything that might catch fire.
- Don't pull into a service station!
- Use your CB if you have one to notify the police of your problem and your location.

Keep the fire from spreading. Before trying to put out the fire, make sure that it doesn't spread any further.

- With an **engine** fire, turn off the engine as soon as you can. Don't open the hood if you can avoid it. Shoot extinguishers through louvers, radiator, or from the underside of the vehicle.
- For a **cargo** fire in a van or box trailer, keep the doors shut, especially if your cargo contains hazardous materials. Opening the van doors will supply the fire with oxygen and can cause it to burn very fast.

Use the right fire extinguisher.

- The B:C type fire extinguisher is designed to work on electrical fires and burning liquids. The A:B:C type is designed to work on burning wood, paper, and cloth as well.
- Water can be used on wood, paper or cloth, but don't use water on an electrical fire (you could get shocked) or a gasoline fire (it will just spread the flames).
- A burning tire must be cooled. Lots of water may be required.
- If you're not sure what to use, especially on a hazardous materials fire, wait for qualified fire fighters.

Extinguish the fire. Here are some rules to follow in putting out a fire:

- Know how the fire extinguisher works. Study the instructions printed on the extinguisher **before** you need it.
- When using the extinguisher, stay as far away from the fire as possible.
- Aim at the source or base of the fire, not up in the flames.
- Position yourself upwind. Let the wind carry the extinguisher to the fire rather than carrying the flames to you.
- Continue until whatever was burning has been cooled. Absence of smoke or flame does not mean the fire is completely out or cannot restart.
- Only try to extinguish a fire if you know what you are doing and it is safe to do so.

Test Your Knowledge

1. What are some things to do at an accident scene to prevent another accident?
2. Name two causes of tire fires.
3. What kinds of fires is a B:C extinguisher **not** good for?
4. When using your extinguisher, should you get as close as possible to the fire?
5. Name some causes of vehicle fires.

These questions may be on the test. If you can't answer all, reread Sections 2.15 and 2.16.

Driving a vehicle for long hours is tiring. Even the best of drivers will become less alert. However, there are things that good drivers do to help stay alert and safe. Here are a few suggestions:

Get enough sleep. Leaving on a long trip when you're already tired is dangerous. If you have a long trip scheduled, make sure that you get a good sleep before you go. Most people require 7 - 8 hours of sleep every 24 hours.

Schedule trips safely. Your body gets used to sleeping during certain hours. If you are driving during those hours, you will be less alert. If possible, try to schedule trips for the hours you are normally awake. Many heavy motor vehicle accidents occur between midnight and 6 a.m. Tired drivers can easily fall asleep at these times, especially if they don't regularly drive at those hours. Trying to push on and finish a long trip at these times can be very dangerous.

Avoid medication. Many medicines can make you sleepy. Those that do have a label warning against operating vehicles or machinery. The most common medicine of this type is an ordinary cold pill. If you have to drive with a cold, you are better off suffering from the cold than from the effects of the medicine.

Keep cool. A hot, poorly ventilated cab can make you sleepy. Keep the window or vent cracked or use the air conditioner, if you have one.

2.17 Staying Alert and Fit to Drive

Be Ready To Drive

Take breaks. Short breaks can keep you alert. But the time to take them is **before** you feel really drowsy or tired. Stop often. Walk around, and inspect your vehicle. It may help to do some physical exercises.

When You Do Become Sleepy

When you are sleepy, trying to "push on" is far more dangerous than most drivers think. It is a **major cause of fatal accidents**. Here are some important rules to follow:

Stop to sleep. When your body needs sleep, sleep is the only thing that will work. If you have to make a stop anyway, make it whenever you feel the first signs of sleepiness, even if it is earlier than you planned. By getting up a little earlier the next day, you can keep on schedule without the danger of driving while you are not alert.

Take a nap. If you can't stop for the night, at least pull off the road and take a nap. A nap as short as a half-hour will do more to overcome fatigue than a half-hour coffee stop.

Avoid drugs. There are no drugs that can overcome being tired. While they may keep you awake for a while, they won't make you alert. And eventually, you'll be even more tired than if you hadn't taken them at all. Sleep is the only thing that can overcome fatigue.

Alcohol and Driving

Drinking alcohol and then driving is a very serious problem. People who drink alcohol are involved in traffic accidents resulting in over 20,000 deaths every year. You should know:

- How alcohol works in the human body.
- How it affects driving.
- Laws regarding drinking and driving.
- Legal, financial, and safety risks of drinking and driving.

The Truth About Alcohol. There are many dangerous ideas about the use of alcohol. The driver who believes in these wrong ideas will be more likely to get into trouble. Here are some examples:

FALSE	THE TRUTH
Alcohol increases your ability to drive	Alcohol is a drug that will make you less alert and reduce your ability to drive safely
Some people can drink a lot and not be affected by it	Everyone who drinks is affected by alcohol
If you eat a lot first, you won't get drunk	Food will not keep you from getting drunk
Coffee and a little fresh air will help a drinker sober up	Only time will help a drinker sober up - other methods just don't work
Stick with beer - it's not as strong as wine or whiskey	A few beers are the same as a few shots of whiskey or a few glasses of wine

What is a Drink? It is the alcohol in drinks that affects human performance. It doesn't make any difference whether that alcohol comes from "a couple of beers" or from two glasses of wine or two shots of hard liquor.

All of the following drinks **contain the same amount of alcohol:**

- A 12 ounce glass of 5% beer
- A 5 ounce glass of 12% wine
- A 1 1/2 ounce shot of 80 proof liquor

How alcohol works. Alcohol goes directly from the stomach into the blood stream. A drinker can control the amount of alcohol which he or she takes in, by having fewer drinks or none. However, the drinker cannot control how fast the body gets rid of alcohol. If you have drinks faster than the body can get rid of them, you will have more alcohol in your body and your driving will be more affected. The amount of alcohol in your body is commonly measured by the Blood Alcohol Concentration (BAC).

What Determines Blood Alcohol Concentration. BAC is determined by the amount of alcohol you drink (more alcohol means higher BAC), how fast you drink (faster drinking means higher BAC), and your weight (a small person doesn't have to drink as much to reach the same BAC).

Alcohol and the Brain. Alcohol affects more and more of the brain as BAC builds up. The first part of the brain affected controls judgement and self control. One of the bad things about this is it can keep drinkers from knowing they are getting drunk. And of course, good judgement and self control are absolutely necessary for safe driving.

As blood alcohol concentration continues to build up, muscle control, vision, and coordination are affected more and more. Eventually, a person will pass out.

How Alcohol Affects Driving. All drivers are affected by drinking alcohol. Alcohol affects judgement, vision, coordination, and reaction time. It causes serious driving errors, such as:

- Increased reaction time to hazards
- Driving too fast or too slow.
- Driving in the wrong lane.
- Running over the curb.
- Weaving.
- Straddling lanes.
- Quick, jerky starts.
- Not signaling, failure to use lights.
- Running stop signs and red lights.
- Improper passing.

These effects mean increased chances of a crash and chances of losing your driver's license. Accident statistics show that the chance of a crash is much greater for drivers who have been drinking than for drivers who were not.

- **Other Drugs**

Besides alcohol, other legal and illegal drugs are being used more often. Laws prohibit possession or use of many drugs while on duty. They prohibit being under the influence of any "controlled substance"; an amphetamine (including "pep pills" and "bennies") narcotics or any other substance which can make the driver unsafe. This could include a variety of prescription and over-the-counter drugs (cold medicines) which may make the driver drowsy or otherwise affect safe driving ability. However, possession and use of a drug given to a driver by a doctor is permitted if the doctor informs the driver that it will not affect safe driving ability.

Pay attention to warning labels of legitimate drugs and medicines and to doctor's orders regarding possible effects. Stay away from illegal drugs. Don't use any drug that hides fatigue - the only cure for fatigue is rest. Alcohol can make the effects of other drugs much worse. The safest rule is don't mix drugs with driving at all.

Use of drugs can lead to traffic accidents resulting in death, injury and property damage. Furthermore, it can lead to arrest, fines, and jail sentences. It can also mean the end of a person's driving career.

- **Illness**

Once in a while, you may become so ill that you cannot operate a motor vehicle safely. If this happens to you, you must not drive. However, in case of an emergency you may drive to the nearest place where you can safely stop.

2.18 Hazardous Materials Rules For All Commercial Drivers

- **What Are Hazardous Materials**

All drivers should know something about hazardous materials. You must be able to recognize hazardous cargo, and you must know whether or not you can haul it without having a Hazardous Material endorsement to your CDL license.

The Federal Hazardous Materials Table names materials that are hazardous. They pose a risk to health, safety, and property during transportation. You must follow the many rules about transporting them. The intent of the rules is to

- contain the product,
- communicate the risk,
- ensure safe drivers and equipment.

- **Why Are There Rules?**

To contain the product: Many hazardous products can injure or kill on contact. To protect drivers and others from contact, the rules tell shippers how to package safely. Similar rules tell drivers how to load, transport, and unload bulk tanks. These are containment rules.

To communicate the risk: The shipper uses a shipping paper and package labels to warn dockworkers and drivers of the risk. Shipping orders, bills of lading, and manifests are all examples of shipping papers.

There are 22 different hazard classes. A material's hazard class reflects the risks associated with it. Here are the 22 hazard classes.

Blasting Agent	Nonflammable Gas
Combustible Liquid	Organic Peroxide
Corrosive	ORM-A
Etiblogic Agents	ORM-B
Explosive A	ORM-C
Explosive B	ORM-D
Explosive C	ORM-E
Flammable Gas	Oxidizer
Flammable Liquid	Poison A
Flammable Solid	Poison B
Irritating Material	Radioactive Material

Shippers write the name of the hazard class of hazardous products in the item description on the shipping paper. Similar words should show on four inch diamond shaped labels on the containers of hazardous materials. If the diamond label won't fit on the container, shippers put the label on a tag. For example, compressed gas cylinders that will not hold a label will have tags or decals. Labels look like the examples shown in Figure 2-15.

After an accident or hazardous material leak, the driver may be unable to speak when help arrives. Fire fighters and police must know the hazards involved in order to prevent more damage or injury. The driver's life, and the lives of others, may depend on quickly finding the shipping papers for hazardous cargo. For that reason,

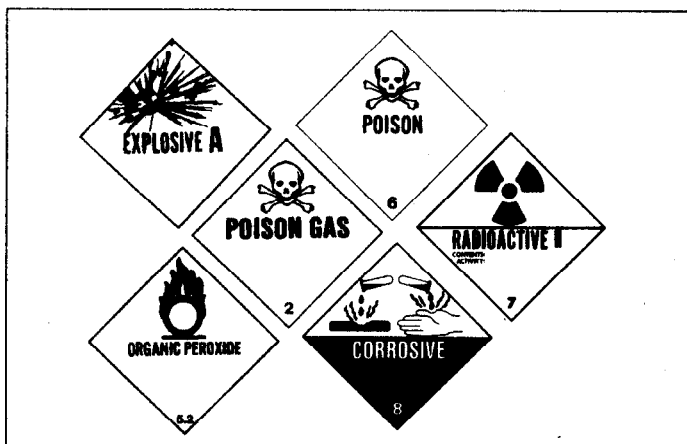


Figure 2-15
Examples of Labels

you must tab shipping papers related to hazardous materials, or keep them on top of other shipping papers. You must also keep shipping papers

- in a pouch on the driver's door, or
- in clear view within reach, or
- on the driver's seat.

Drivers must use placards to warn others of their hazardous cargo. Placards are signs placed on the outside of a vehicle to show the hazard class(es) of products on board. There are 19 different DOT placards. A chart showing example placards appears at the end of Section 7. Each is turned upright on a point, like a diamond shape. The person who does the loading must place the placards on the front, rear, and both sides of the vehicle.

Not all vehicles carrying hazardous materials need to have placards. The rules about placards are given in Section 7 of this driver's manual. You can drive a vehicle that carries hazardous materials if it does not require placards. If it requires placards, you must not drive it unless your driver's license has the hazardous materials endorsement.

To ensure safe drivers and equipment: The rules require all drivers of placarded vehicles to learn how to safely load and transport hazardous products. They must have a commercial driver's license with the hazardous materials endorsement.

To get the required endorsement you must pass a written test on material found in Section 7 of this manual. You also will need a tank endorsement if you transport hazardous products in a cargo tank on a truck larger than 26,000 pounds, gross vehicle weight rating.

Drivers who need the hazardous materials endorsement must learn the placard rules. If you do not know if your vehicle needs placards, ask your employer. **Never drive a vehicle needing placards unless you have the hazardous materials endorsement.** To do so is a crime. When stopped, you will be cited and you will not be allowed to drive your truck further. It will cost you time and money. A failure to placard when needed will risk your life and others if you have an accident. Emergency help will not know of your hazardous cargo.

Hazardous materials drivers must also know which products they can load together, and which they can not. These rules are also in Section 7. Before loading a truck with more than one type of product, you must know if it is safe to load them together. If you do not know, ask your employer.

Test Your Knowledge

1. Common medicines for colds can make you sleepy. True or false?
2. What should you do if you do become sleepy while driving?
3. Coffee and a little fresh air will help a drinker sober up. True or false?
4. What is a hazardous materials placard?
5. Why are placards used?

These questions may be on the test. If you can't answer all, reread Sections 2.17 and 2.18.